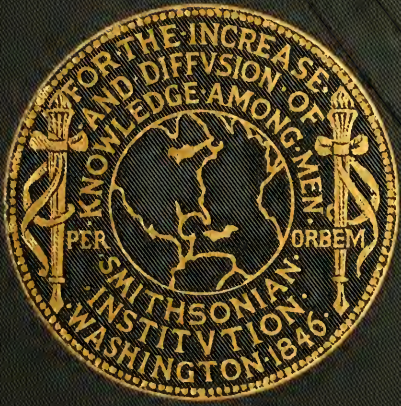
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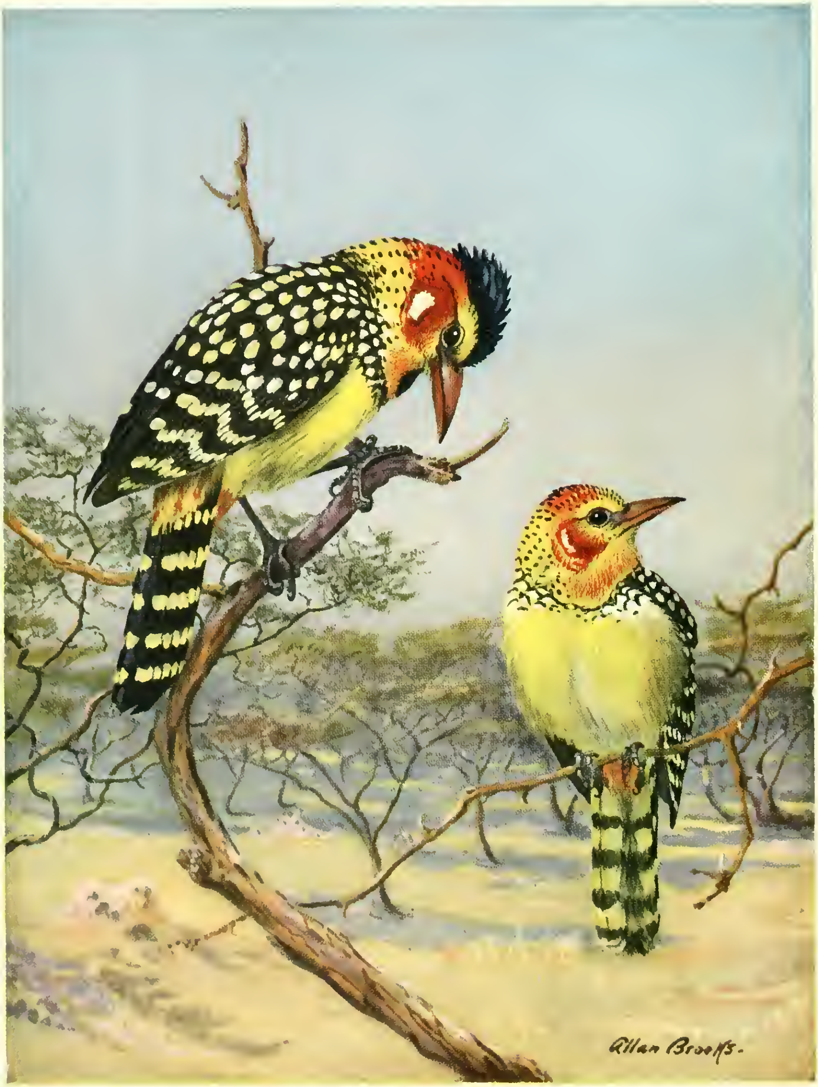
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UNITED STATES NATIONAL MUSEUM
BULLETIN 153

BIRDS COLLECTED BY THE CHILDS FRICK EXPEDITION TO ETHIOPIA AND KENYA COLONY

PART 1. NON-PASSERES

BY

HERBERT FRIEDMANN
Curator, Division of Birds, United States National Museum

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The present work forms No. 153 of the *Bulletin* series.

Alexander Wetmore,
Assistant Secretary, Smithsonian Institution.

Washington, D. C., May 5, 1930.

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BIRDS COLLECTED BY THE CHILDS FRICK EXPEDITION TO ETHIOPIA AND KENYA COLONY

Part 1. NON-PASSERES

By Herbert Friedmann

Curator, Division of Birds, United States National Museum

ACKNOWLEDGMENTS

This report, covering the nonpasserine birds collected by the Childs Frick African Expedition, was undertaken, the material studied, and the report finished while I was a member of the department of biology in Amherst College and an associate in African ornithology in the Museum of Comparative Zoölogy at Harvard University. The actual study of material and literature was done at the latter institution, where Messrs. Outram Bangs and James Lee Peters very kindly put the collections under their care at my disposal. Dr. Thomas Barbour has greatly facilitated the present study by generously purchasing for the Museum of Comparative Zoölogy many species of East African birds not otherwise represented, and which proved most useful in the revisionary work involved in the examination of the present material.

To Dr. Alexander Wetmore and Dr. Charles W. Richmond, of the United States National Museum, I am indebted for many favors; to the former for the privilege of studying the splendid series collected by the Frick Expedition, to the latter for the care and trouble he has taken in packing and shipping to Cambridge all the birds listed in the present report, for loans of special material needed for comparative purposes, and for much assistance in reading proofs of this report.

No one who has done any extensive systematic work will fail to realize that for its successful completion large collections and extensive specialized library facilities are indispensable. It was therefore out of the question to pursue investigations of this sort in Amherst College, and, realizing this condition, my former colleagues there, Dr. Otto C. Glaser and Dr. Harold H. Plough, very kindly permitted me to arrange my teaching duties so that I was free almost every week by Wednesday evening and was able to spend three consecutive days a week in the Museum of Comparative Zoölogy. President A. S. Pease, of Amherst College, not only took a sympathetic interest in the work but actively aided it by obtaining a special grant to offset the expense involved in constantly traveling between Amherst and Cambridge. To the donor of this grant, Mr. Cornelius J. Sullivan, one of Amherst's most valued alumni, I take this opportunity of expressing my thanks for his support. Another, smaller grant from the research funds of Amherst College also lightened the financial difficulties always present in any research work.

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In the matter of photographic illustrations used in this report, I am greatly indebted to Mr. Childs Frick for the use of 16 pictures taken by him during the course of the expedition. Mr. T. Donald Carter, of the department of mammals in the American Museum of Natural History, has generously permitted me to use six photographs taken by him in Arussiland and in Shoa.

HISTORICAL INTRODUCTION

The study of the ornithology of northeastern Africa may be said to have begun with the voyages of Petrus Forskäl and of James Bruce. The former touched merely the low coastal plains along the Red Sea, and his work "Descriptiones Animalium, Avium, Amphibiorum, Piscium, Insectorum, Vermium; quae in Itinere Orientali Observavit," published in 1775, deals more with the fauna of the Yemen district of Arabia, and with that of Egypt than of the Ethiopian-Eritrean-Somali area. Bruce, on the other hand, penetrated inland and, although his writings were looked upon with doubt and suspicion for some years, there is no longer any reason to treat his work with anything but the respect due to a pioneering enterprise. The bird notes of his trip are in the appendix to the fifth volume of his "Travels to Discover the Source of the Nile in Egypt, Arabia, Abyssinia, and Nubia," printed in 1790. H. Salt made an adventurous journey into Eritrea and northern Ethiopia in 1809–10, the ornithological results of which were reported on by Stanley in the appendix to Salt's "A Voyage to Abyssinia, and Travels into the Interior of that Country," etc., 1814.

These three trips served more to call attention to the fact that northeastern Africa presented a rich and promising field for zoological exploration rather than to even begin to describe the vertebrate fauna of the country. The first man to betake himself to that region primarily to collect and study its bird life was Eduard Rüppell. In 1822 he made a memorable journey to Egypt, Nubia, and Kordofan, and 10 years later an equally important trip to Ethiopia. As a result of his work over 100 species of birds were made known to science for the first time—one of the largest numbers of novelties discovered by any single explorer in Africa. In his Systematische Ubersicht der Vögel Nordostafrikas, published in 1845, he lists no fewer than 532 species for the region from Egypt to Ethiopia, inclusive. At about the same time that Rüppell was in the field Ehrenberg and Hemprich explored the Eritrean-Danakil coastal region (1820–1826) getting inland as far as Dongola on the Nile. Their trip resulted in the now scarce " Symbolae Physicae seu Icones et Descriptiones Avium, quae ex itinere per Africam borealem et Asiam occidentalum F. G. Hemprich et Ch. G. Ehrenberg studio novae aut illustratae redierunt," which appeared in 1828. In the 30's of the last century Hedenborg made a small collection in Sennar and Kordofan which was published on by Sundevall.[1] A. E. Brehm's "Reise nach Habesch " (1863) based on his own wanderings, contains many notes on birds of northeast Africa.

The next quarter of a century was one of great activity in Ethiopian ornithology. Lefebvre, Petit, and Quartin-Dillon spent the four years 1839–1843 in Ethiopia and collected many birds reported on by Prevost and Des Murs.[2] From 1840 to 1842 Ferret and Galinier traveled in extreme northern Ethiopia and made important collections. The bird notes in their " Voyage en Abyssinia, dans les provinces du Tigré, du Samen et de l'Amhara " (Paris, 1847–1848), are not consulted to any extent any more, but Guérin Méneville's papers, based on their material, are still referred to as they contain descriptions of not a few new birds.[3] Of Guérin Méneville's types all 15 are now in the Museum of Comparative Zoölogy and have been available to me in the present study. The Herzog Paul Wilhelm von Württemberg collected birds in central and northeastern Africa during 1842–1844. Baldamus published on them [4] as he also did [5] on the specimens collected by Doctor Vierthaler in Egypt, Nubia, Dongola, and Sennar. Antinori, Hartmann, and others were also actively collecting at this time, but in a brief summary, such as this, we may concentrate at this point on the work of Theodor von Heuglin, perhaps the most outstanding name in Ethiopian ornithology.

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[1] Foglar frän Nordöstra Afrika: Oefvers. Kgl. Vetensk. Akad. Förhandl., 1850, pp. 125–133.

[2] In Lefebvre, Voyage en Abyssinie, executé pendant les années 1839–1843. 4. Histoire Naturelle, 1850—Zoologie, vol. 6.

[3] Rev. Zool., 1843, pp. 161–162 and 321–322.

[4] Naumannia, pt. 7, 1857, pp. 432–435.

[5] Idem, pts. 5–7, 1855–1857.

Heuglin spent approximately 12 years in the field, observing and collecting, and published a long series of papers dealing with his observations. His culminating work was the classic "Ornithologie Nordost-Afrikas, der Nilquellen und Küsten-Gebiete des Rothen Meeres und des nördlichen Somal-Landes," of which the first volume appeared in 1869 and the second in 1871. This work put the ornithology of this region on a firm basis and is still the only general work with any claim to completeness. In it are described no fewer than 948 species of birds. It summarized not only von Heuglin's own observations, but also all those previously recorded by others. Blanford's useful "Geology and zoology of Abyssinia," appeared in 1870 and contains much information about the birds of the Tigre and adjacent portions of Ethiopia, and of Eritrea, while Finsch's valuable report on Jesse's collections made in Bogosland[6] supplements Blanford's work. However, most of the work done up to 1870 dealt either with the coastal areas, the Nile Valley, or northern Ethiopia. Central Ethiopia, Shoa, Arussiland, and Gallaland were still largely unknown. Van Heuglin's field work included a survey of the region about Lake Tsana and of western Ethiopia. Sir Samuel W. Baker's extensive explorations of the Blue Nile and its tributaries unfortunately yielded almost nothing ornithologically.

Antinori, Ragazzi, and Traversi (1876–87) were the first to make extensive collections in Shoa (which were worked out by Salvadori and by Giglioli). Bottego's zoological explorations of Eritrea (reported on by Del Prato in 1891) Muzioli's work in the Tigre district, and Blundell and Lovat's journey through Somaliland and southern Gallaland (published on by Ogilvie-Grant, Ibis, 1900, pp. 115–178, and 304–337) all added considerably to what was known of the birds and their distribution. Revoil's trip to Somaliland in 1880 resulted in further discoveries, described by Oustalet. The work of Lort Phillips, in the highlands of British Somaliland, and of Donaldson Smith in the region between southern Somaliland, Jubaland, and Lake Rudolf contributed much of importance.

In the meanwhile (1887–88) Count Teleki had marched northwards from Mount Kilimanjaro, past Mount Kenya, up the Rift Valley and had discovered Lakes Rudolf and Stefanie, but aside from scattered references, his expedition contributed little as far as the birds were concerned. With the advent of the British East Africa Co., numerous collections began pouring into the British Museum from what is now Kenya Colony. Sir Frederick Jackson's is, perhaps, the most outstanding name in this connection. The late Richard Bowdler Sharpe and Dr. Anton Reichenow published many papers on the avifauna of East Africa.

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[6] Trans. Zool. Soc. Lond., vol. 7, 1872, pp. 197–331.

By far the most important contributions to knowledge of the avifauna of Ethiopia made in the last 30 years have resulted from the expeditions and investigations of Carlo von Erlanger, Oscar Neumann, and Graf von Zedlitz (all of whose results were published in the Journal für Ornithologie, 1904–1915). To these three ornithologists, more than to any others, is due the present exactness of our information of the distribution and subspecific variations of the birds of that country.

The Frick expedition followed partly along the routes taken by Erlanger, Neumann, and others, but instead of stopping in southern Shoa, went on southward a good distance to the east of Teleki's route and explored a sizable tract of land to the east of Lake Rudolf, previously unknown, and then on to the Athi River to the Uganda Railway. After his return from Africa, Dr. E. A. Mearns began his investigations of the geographic variations of the birds of eastern Africa, a work that has since been carried on actively by a number of investigators, among whom the most prominent are V. G. L. van Someren, Claude H. B. Grant, and Oscar Neumann. It is a matter greatly to be regretted that the collections brought back by Mearns and Frick should have had to lie dormant ever since Mearns' death in 1916, inasmuch as the collections contain many birds that were unknown at the time they were obtained and which have since been described from other sources.

It should be clearly understood that Mearns planned to write a complete report, not only on the birds collected by the Frick expedition, but also on those obtained (chiefly by himself) by the Smithsonian-Roosevelt expedition. To this end he borrowed and examined most of the east African material in American museums, and published descriptions of no fewer than 88 species and subspecies new to science. The birds collected by the Frick expedition total approximately 5,200 specimens, a monument to the industry of Mearns.

Inasmuch as the activity of other investigators has practically drained northeastern Africa of unknown birds, I have been more concerned, in the present report, with revising many of the groups, elucidating their plumages and molts, and mapping more accurately their respective ranges. Wherever it has been possible to identify Mearns' field notes beyond all doubt I have incorporated them, and have also made use of the biological observations of von Erlanger and others, in the hope that the utmost significance may have been extracted from the material and data, and the report made most serviceable to the widest circle of ornithologists. I have purposely refrained from any account of the zoogeographic problems of the territory covered by the present collection until all the birds have been studied, but I intend to write of the faunistics of northeastern Africa in some detail in the second volume of this report.

Since the Frick expedition returned from Africa some 18 years ago, several political changes have taken place in that continent. Thus, what was the kingdom of Abyssinia is now known as Ethiopia, the old British East Africa has become Kenya Colony; German East Africa is now called Tanganyika Territory and Portuguese East Africa is officially known as Mozambique. In the present report the most recent political names have been used throughout, but the adjective "Abyssinian" has been retained and used as well as the synonymous "Ethiopian."

Of the large and valuable collection of birds made during the course of the expedition considerable series have been very generously presented to the United States National Museum by Mr. Frick, to whom all American ornithologists interested in the growth of their national collections owe a great debt of gratitude.

ITINERARY

The Childs Frick African expedition left New York in October, 1911, and arrived at Djibouti, on the Red Sea, in French Somaliland, on November 22. From there the party, consisting of Mr. Childs Frick, Lieut. Col. Edgar A. Mearns, Dr. Donald G. Rafferty, Mr. J. C. Blick, and Mr. Alfred Bradley, went by the railroad to Dire Daoua, Ethiopia, a distance inland from the coast of about 200 miles. From Dire Daoua Mr. Frick and Colonel Mearns went another 200 miles to Adis Abeba, the capital of Ethiopia, and returned by way of Ankober, the ancient Shoan capital, to the Hawash River at Sadi Malka, where the other members of the party had assembled a base camp. From there the party proceeded through the Arussi and Galla countries to Gardula, south of the Abaya Lakes in the Rift Valley in southern Shoa. Near there (at Tertale) pack mules were exchanged for camels, an affair that delayed the party for two months, but that gave Mearns an opportunity to collect extensively during the nesting season in the Gato River district. In the meantime Mr. Frick made a side trip to Lake Stefanie, which body of water was completely circumferenced, and to the Omo River. Only a few birds were collected on this excursion. Finally all the necessary camels were procured and the party advanced southward into Kenya Colony through a previously untraversed region to the far east of Lake Rudolf. Thence by the south end of Lake Rudolf over a new route to the east of Mount Kenia to the Tana River (at 1,200 feet), and up the Tana, Thika, and Athi Rivers to the Uganda Railway at Athi River station, where the party arrived September 1, 1912. On September 3 they reached Nairobi and Mearns left the next morning for Escarpment, where he collected from September 4–12. The reunited party left Nairobi the next day, and sailed from Mombasa on September 16.

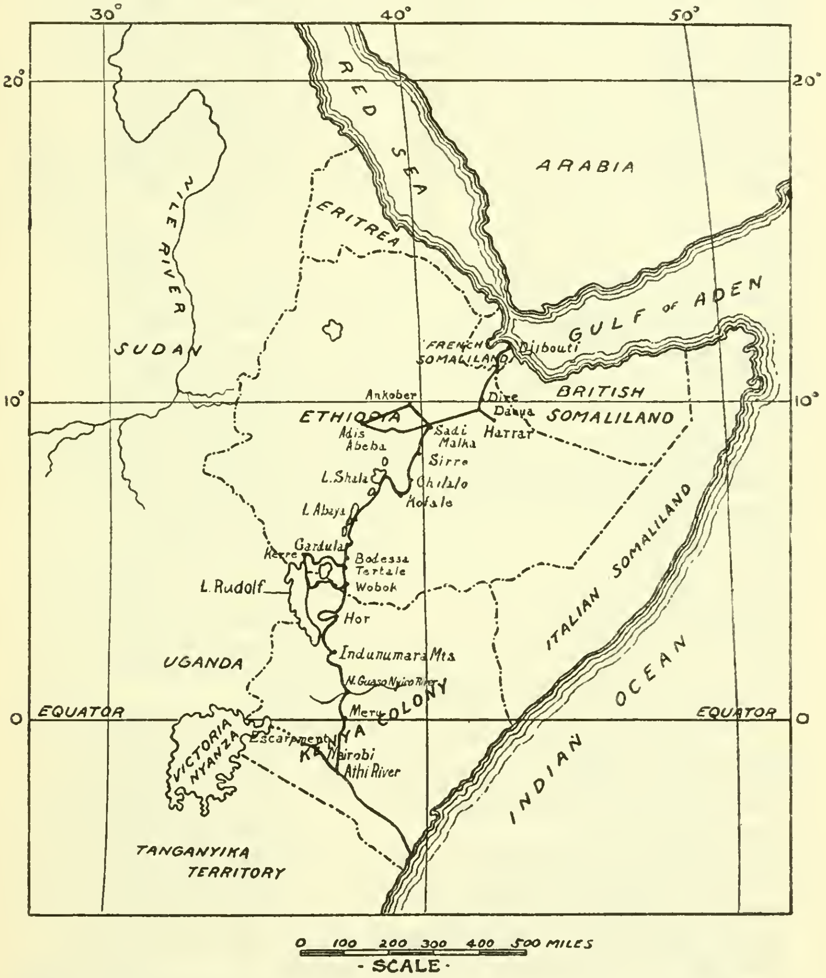

Figure 1.—Route of the Frick Expedition, Showing Most of the Important Collecting Localities

A detailed list of collecting localities, with dates, is here appended.

French Somaliland, Djibouti	Nov. 22–23, 1911.
Ethiopia:	
Dire Daoua	Nov. 27 to Dec. 11, 1911.
Errer	Dec. 13, 1911.
Tollo	Dec. 14–16, 1911.
Moulu	Dec. 17, 1911.
Bilan	Dec. 18–19, 1911.
Sadi Malka	Dec. 20–21, 1911.
Chadi Malka	Dec. 22, 1911.
Wadi Malka	Dec. 22, 1911.
Chobi	Dec. 23, 1911.
Gada Bourca	Dec. 24–26, 1911.
Adis Abeba	Dec. 27, 1911, to Jan. 13, 1912.
Hakaki	Jan. 14–15, 1912.
Alaltu	Jan. 15–17, 1912.
Camp west of Saleish	Jan. 18, 1912.
Camp east of Saleish	Jan. 19, 1912.
Camp near Ankober	Jan. 20–21, 1912.
Ankober	Jan. 22, 1912.
Duletcha	Jan. 24–25, 1912.
Gabra Dulcha	Jan. 25, 1912.
Sadi Malka	Jan. 25 to Feb. 3, 1912.
Iron Bridge, Hawash River	Feb. 4–5, 1912.
Hawash River	Feb. 6–13, 1912.
Sirre	Feb. 13, 1912.
Arussi Plateau	Feb. 14–29, 1912.
Cofali	Mar. 2–3, 1912.
Malke, Sidamo Province	Mar. 3–4, 1912.
Botola	Mar 4–5, 1912.
Loku	Mar. 5–6, 1912.
Aletta, Sidamo Province, 6,000 feet (1,800 meters)	Mar. 6–11, 1912.
Loco, near Lake Abaya	Mar. 13–15, 1912.
Gidabo River, 4,500 feet (1,350 meters)	Mar. 15–17, 1912.
North or "Black" Lake Abaya	Mar. 17–19, 1912.
Galana River	Mar. 19–20, 1912.
Black Lake Abaya, southeast	Mar. 21–22, 1912.
"Bridge" between Abaya Lakes	Mar. 23, 1912.
South or "White" Lake Abaya	Mar. 24–26, 1912.
Spring between Abaya Lakes and Gardula	Mar. 26–29, 1912.
Gato River near Gardula, 4,000 feet (1,200 meters)	Mar. 29 to May 17, 1912.
Gato River crossing	May 17, 1912.
Anole village, 5,000 feet (1,500 meters)	May 18, 1912.
Kormali village	May 18–19, 1912.
Sagon River	May 19, 1912.
Bodessa	May 19 to June 6, 1912.
Sagon River	June 3–6, 1912.
Tertale	June 7–12, 1912.
El Ade	June 12–13, 1912.
Mar Mora	June 14–15, 1912.

Ethiopia—Continued.	
Turturo	June 15–17, 1912.
Biderou	June 15, 1912.
Anole	June 17, 1912.
Wobok	June 18–19, 1912.
Saru	June 19, 1912.
Yebo	June 20–21, 1912.
Karsa Barecha	June 21, 1912.
Malata	June 22, 1912.
Chaffa—	
Upper village	June 23, 1912.
Lower village	June 24–25, 1912.
Kenya Colony:	
Hor, Latitude 3° 19′ N	June 26–30, 1912.
Dry River 18 miles southwest of Hor	July 1–2, 1912.
Dussia, latitude 3° N	July 3–4, 1912.
Lake Rudolf—	
East	July 5–6, 1912.
South end	July 7–10, 1912.
10 miles south of	July 9, 1912.
Southeast	July 11, 1912.
10 to 25 miles southeast of	July 12, 1912.
Nyero Mountains, south of	July 13, 1912.
Indunumara Mountains	July 13–18, 1912.
Plains north of Endoto Mountains	July 18–19, 1912.
North base of Endoto Mountains	July 20, 1912.
South base of Endoto Mountains	July 21–24, 1912.
Er-re-re Villages	July 25, 1912.
Le-se-dun	July 26, 1912.
Malele	July 27, 1912.
18 miles south of Malele	July 28–29, 1912.
River 24 miles south of Malele	July 29, 1912.
35 miles north of Northern Guaso Nyiro River	July 29–30, 1912.
40 miles south of Malele	July 30, 1912.
25 miles north of Northern Guaso Nyiro River	July 30, 1912.
Northern Guaso Nyiro River	July 31, to Aug. 3, 1912.
Lekiundu River	Aug. 4–8, 1912.
Guaso Mara River	Aug. 9, 1912.
Meru Forest near Mount Kenia	Aug. 9, 1912.
Meru Forest and Kilindini	Aug. 10, 1912.
20 miles east of Meru on trail to Tana River	Aug. 11, 1912.
Tharaka district	Aug. 12–14, 1912.
Tana River, 1,200 feet (camps 1–6)	Aug. 12–23, 1912.
Tana River at mouth of Thika River	Aug. 23–26, 1912.
East of Ithanga Hills	Aug. 26, 1912.
Bowlder Hill, 20 miles above mouth of Thika River	Aug. 27, 1912.
9–20 miles up the Thika River	Aug. 27, 1912.
Thika River, west of Ithanga Hills	Aug. 28, 1912.
Between Thika and Athi Rivers	Aug. 29, 1912.
Athi River near Juja Farm	Aug. 30–31, 1912.
Athi River Station, Uganda Railway	Sept. 1–2, 1912.
Nairobi	Sept. 3, 1912.
Escarpment	Sept. 4–12, 1912.

ACCOUNT OF THE SPECIES

Before passing on to the discussion of the forms of birds represented in the collection, a word may be said about the classification and nomenclature used in this report. On the whole I have tried to follow the arrangement used by Sclater in his "Systema Avium Ethiopicarum" (1924) as that work will undoubtedly be the standard reference list for some years. Wherever changes from this list are made, the reasons are given in full. The arrangement of the genera within the families and of the species within the genera is substantially the same as in Sclater's work. The sequence of orders and families, however, is patterned after Wetmore's recent classification (Proc. U. S. Nat. Mus. vol. 76, 1929, pp. 1–8), which is based on broader and sounder lines than the older scheme originated by Gadow and followed by Sclater.

In the matter of recognizing or rejecting races and names I have adhered to a policy of following Sclater's list in all cases where I have not had sufficient material to decide for myself. In such cases I have tried to incorporate such discussions, for and against, that have appeared in literature, so that the investigator blessed with more abundant material may decide their merits with the least expenditure of time and effort.

Unless otherwise mentioned, all measurements are in millimeters.

Superorder PALAEOGNATHAE

Order STRUTHIONIFORMES

Family STRUTHIONIDAE

STRUTHIO CAMELUS MASSAICUS Neumann

Struthio massaicus NEUMANN, Journ. f. Ornith., vol. 46, p. 243, 1898: Ukamba, Kenya Colony.

"The ostriches around Juja Farm, Nairobi, and thence southwest to the Loita Plains, in the Sotik District, south of the Southern N'guasso Nyiro River were of this species." (E. A. Mearns.)

The only definite records I find in Doctor Mearns' notes are to the effect that 20 ostriches were seen near the Athi River, Kenya Colony, on August 31, and two the following day near the Athi station of the Uganda Railway. This paucity of records means little in this case as ostriches are numerous all through the Athi-Kapiti district. I saw great numbers of them there in 1925.

STRUTHIO CAMELUS MOLYBDOPHANES Reichenow

Struthio molybdophanes REICHENOW, Mitt. Orn. Ver. Wien, p. 202, pl. S, 1883: Somaliland.

Specimens collected:

Fifteen miles south of Lake Rudolf, July 12, 1912, one feather from an ostrich that was killed and eaten by a lion and lioness.

In his manuscript notes Mearns wrote that the "* * * ostriches seen by the Frick expedition from the region of the Abaya Lakes south to the Northern Guaso Nyiro were probably of this species. Only eggs and a fragment of a male bird that had been killed and eaten by a pair of lions were taken by us in this region." On going through his notebooks I find the following definite records, all observational.

Six ostriches were seen on June 23 at a village near Boran, Lower Chaffa district, Ethiopia; two were noted on July 11, 10 miles southeast of Lake Rudolf, Kenya Colony; fresh eggs were found near a spring in the Indunumaro Mountains, Kenya Colony; an eggshell (broken) on the Guaso Nyiro, July 31 to August 3; and several eggs at Lekiundu River, Guaso Nyiro, August 4.

The single feather collected seems to be of normal size (684 millimeters) although I have no comparative material. Doctor Van

Someren[7] writes that, "* * * a 'pigmy' ostrich has been reported from south of Lake Rudolf, but no specimens have been procured."

Judging from the paucity of observational records, as listed above, it would seem that the ostrich is rather uncommon in southern Ethiopia and northern Kenya Colony.

Lönnberg, who collected an ostrich near Lekiundu River, makes no particular comment on the abundance of the bird other than that the species was seen several times to the east of the Marsabit road, usually on open plains in the thorn bush, but occasionally even in thick thorn bush.

The bare skin of the neck of *molybdophanes* is bluish-gray like that of the South African *australis*, while the form in the intermediate area, *massaicus*, has the skin reddish in color.

An adult male ostrich sent from Adis Abeba as a present to President Roosevelt by King Menelik and which lived for a time in the National Zoological Park, and is now in the United States National Museum (212991), has the following measurements: Culmen (chord) 72; width of midrib of maxilla between nostrils, 16; width of maxilla at posterior border of nostrils, 44; from tip of bill to eye, 125; from tip of bill to angle of mouth, 139; from tip of bill to feathered portion of neck, 710; length of tibia, 540; tarsus, 515; greater toe without claw (measured above), 192; claw of great toe (measured above) 60 millimeters (E. A. Mearns).

The only comparable measurement of the data presented by Lönnberg[8] is that from the tip of the bill to the feathered portion of the neck, which is only 660 millimeters in the Lekiundu bird as opposed to 710 in the Adis Abeba specimen. Both were old males.

In the bird sent by King Menelik there are several mostly white feathers at the base of the neck on each side.

In 1909 (September–October) Colonel Roosevelt collected a mated pair and five young, together with seven eggs at Isiola River, Northern Guaso Nyiro River, Kenya Colony. These now form an exhibition group in the United States National Museum and are labeled *camelus* but are really *molybdophanes*. The male weighed 263, and the female 240 pounds avoirdupois.

Apparently ostriches are less numerous in central Ethiopia than farther south. Mearns saw none between Djibouti and Adis Abeba, although the eggs were seen in native markets, and only two along the Hawash River on February 11. He found none at Gato River or Bodessa but Frick saw a few near Tertale.

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[7] Novit. Zool., 1922, vol. 29, p. 4.

[8] Kungl. Sv. Vet. Akademiens Handlgr., vol. 47, 1911, pp. 34–35.

Von Heuglin [9] writes of a rumor that he heard of a small or pigmy ostrich in northeastern Africa. This rumor probably was the same as that mentioned by Van Someren, but it may be mentioned here in connection with a detail in nomenclature, kindly brought to my attention by Dr. C. W. Richmond. This "pigmy" ostrich is referred by Von Heuglin to "(*L'Autruchon*, *Struthio bidactyles*, Temm.)." The generic name Autruchon, while listed by G. R. Gray,[10] was not new at that point as has generally been assumed, but was first proposed by Temminck [11] on the basis of the " petit *gralle bi-dactyle* " of Levaillant.

Superorder NEOGNATHAE

Order PELECANIFORMES

Family PELECANIDAE

PLECANUS ONOCROTALUS Linnaeus

Pelecanus onocrotalus LINNAEUS, Syst. Nat., ed. 10, p. 132, 1758: Africa.

Specimens collected:
Male adult. Lake Shala, Ethiopia, March 3, 1912.

Inasmuch as "Shala" is the Galla word for pelican, it would be rather disappointing if the expedition had gone to Lake Shala without obtaining one of these birds. Both *onocrotalus* and *roseus* are known to occur on this lake according to Neumann,[12] but only the former was collected by the Frick party.

In spite of the 16 years that have elapsed between the collecting of the specimen and the time of this writing, the bird still has some of the rosy bloom on the underparts.

The bird is fully adult and has the following measurements: Wing, 687; tail. 210; culmen, 435; greatest width of maxilla, 50; least width of maxilla, 38; tarsus, 145 millimeters.

Hartert [13] makes *roseus* a race of *onocrotalus* but in view of the constant differences between them it seems advisable to treat them as species.

Family PHALACROCORACIDAE

PHALACROCORAX CARBO LUGUBRIS Rüppell

Phalacrocorax lugubris RÜPPELL, Syst. Uebers., p. 134, pl. 50, 1845: Ethiopia.

Specimens collected:
One, unsexed, Lake Shala, Ethiopia, March 3, 1912.

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[9] Orn. Nordost Afr., vol. 2, p. 935.

[10] List Gen. Birds, ed. 2. p. 84 (note) 1841.

[11] "Man. d'Ornith.," part 4, ed. 2, 1840, p. 347.

[12] Journ. f. Ornith., 1904, p. 327.

[13] Vögel d. pal. Fauna, p. 1404.

The data as given are taken from the label. However, in Mearns' field catalog no mention is made of this specimen, and on March 3 he certainly was not collecting at Lake Shala, but at Malke and Cofali. It seems that someone else, probably Mr. Childs Frick, collected the specimen. There is some indistinct, blurred pencil writing on the label that is no longer legible. In all probability the data are correct, as Mr. Frick was not with Mearns at Malke, and very likely was the collector in this case.

The size of the bill in this specimen raises serious doubts as to the distinction of *lugubris* and *lucidus*. It is heavy and large, the chord of the culmen being 77 millimeters, larger than a South African example of *lucidus* in the Museum of Comparative Zoölogy. The wing measures 350 millimeters, exceeding in size a small series of both *lucidus* and *lugubris*, the tail is 158, and the tarsus 63 millimeters. With this may be compared the following measurements, a female of *lugubris* from Lake Naivasha, Kenya Colony: Wing, 325; tail, 148; culmen, 64.5; tarsus, 55.5 millimeters.

Large cormorants, undoubtedly of this form, were recorded as follows: Lake Shala, March 3, 1 collected; Black Abaya Lake, March 18–20, inclusive, 7 seen; between Abaya Lake and White Abaya Lake, March 23–26, 4 noted; Lake Rudolf, Kenya Colony, July 5–8, 1,000 together with an equal number of *P. africanus;* from the southeastern end of Lake Rudolf south for a distance of 10 miles, about 200 birds were observed on July 10 and 11.

The specimen is lacking the second rectrix (from the outside) on the left side of the tail.

PHALACROCORAX AFRICANUS AFRICANUS (Gmelin)

Pelecanus africanus GMELIN, Syst. Nat., vol. 1, pt. 2, p. 577, 1789: Africa (restricted type locality: White Nile District, C. H. B. Grant, Ibis, 1915, p. 75).

Specimens collected:

One immature unsexed, Hawash River, Ethiopia, February 10, 1912.

The single specimen collected is unfortunately badly damaged: The tip of the bill is gone and the right foot is missing. The chin and upper throat are pure white with a few dusky feathers showing on the latter; the lower throat and breast are dark grayish brown fading posteriorly into the dull white of the abdomen: the sides, flanks, lower abdomen and under tail-coverts are black. In its general appearance it agrees with a young male from Metet, Cameroon (M.C.Z. 81189), but the upper throat and chin in the latter are not pure white.

The long-tailed cormorant was recorded as follows: Hawash River, February 10, 1 collected; Black Abaya Lake, March 18–

20, inclusive, 24; Lake Abaya, March 21–22, 14 seen; Lake Rudolf, July 5–8, inclusive, about a thousand together with about the same number of *Phalacrocorax lucidus;* about 200 on July 10, also at Lake Rudolf; and 4 on the following day about 10 miles south of the lake; 2, August 31 and September 1 at the Athi River, Kenya Colony, near the Athi station on the Uganda Railway.

As far as I know this is the only cormorant recorded as yet from the area southwest of Lake Rudolf, the so-called Turkanaland country, but so little is known as yet of the avifauna of that region that it seems unlikely that the present species should occur there to the exclusion of *P. c. lugubris.*

It seems rather doubtful that more than one form of this bird exists in continental Africa. An adult specimen from the Transvaal (M.C.Z. 232553) is indistinguishable from others from Tanganyika Territory and from Cameroon. According to Roberts[14] the Transvaal bird should be *africanoides* A. Smith, but it can not be told from undoubted *africanus.* Likewise Millet-Horsin's *menegauxi*[15] seems not separable according to Sclater[16].

Family ANHINGIDAE

ANHINGA RUFA RUFA (Lacépède and Daudin)

Plotus rufus Lacépède and Daudin, in Buffon's Hist. Nat., (18mo., Didot ed.) Quadr., vol. 14, p. 319; Ois., vol. 17, p. 81, 1802: Senegal (from Daubenton, Pl. Enl. 107).

Specimens collected:

Female adult, Lake Abaya, Ethiopia, March 22, 1912.
Female adult, Black Lake Abaya, Ethiopia, March 25, 1912.

Besides the two birds listed above, this species was met with as follows: Two seen on March 18 at Black or North Abaya Lake; 4 on the following day and 2 on the day after; on March 21, 40 were seen at Lake Abaya, and 20 more were noted March 23–26 between Abaya Lake itself and White or South Abaya Lake. In Kenya Colony, 2 were seen on the Tana River, August 15; 4 near the mouth of the Thika River, August 23; 6 in the next few days at the junction of the Tana and Thika Rivers; and 6 on the Athi River August 30 and September 1.

Neither of the two specimens collected is fully adult and both have some brownish feathers on the under parts of the body, the bird from Lake Abaya being more nearly fully adult than the other.

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[14] Annals. Transv. Mus., vol. 10, pt. 3, 1924, p. 140.

[15] Rev. Franc. d'Orn., 1921, vol. 13, p. 177: Togo.

[16] Syst. Avium Ethiopicarum, 1924, p. 21.

The molts in this species are peculiar and deserve mention. A bird, taken on March 11, recorded in his notes by Mearns as a subadult male, but cataloged as a female (Smithsonian African expedition, under Theodore Roosevelt) has * * * the under side of the head and neck paler than in adult males * * *. The tail is complete and handsomely fluted, but every wing quill has been synchronously molted, the incoming quills to replace those recently shed being from 25 to 50 millimeters in length, only the tips of the webs appearing beyond the calamus. Evidently the genus *Anhinga* molts all of the wing quills at the same time, as in the case of the ducks." (E. A. Mearns.) The tail molt is likewise peculiar but may be subject to more variation. The female (U.S.N.M. 218283) from Black Abaya Lake has molted and replaced the innermost and the three outermost pairs of rectrices, and, to judge from the development of the new feathers, the middle pair were the first to be shed, then two pairs were skipped and the outer three pairs molted. This order is borne out by a male in the Museum of Comparative Zoölogy (M.C.Z. 56404) in which only the innermost and the two outermost pairs were shed. In this individual the new central pair are fully grown, as long as the next pair (old feathers) while the new outermost rectrices are only several inches long and the next pair not yet sprouted.

In this connection it is interesting to note that Granvik[17] writes that while the body feathers are molted rapidly and during a definite time, the remiges and rectrices may be molted all year round, " * * * so that, strictly speaking, all individuals are in molt."

Dr. James P. Chapin has sent me the following notes from his manuscript on the birds of the Belgian Congo, from which he has generously allowed me to quote. In describing a molting bird he records that all the remiges are shed at once as in the case recorded above by Mearns.

> * * * The renewal of the rectrices is different. The full length of the tail is preserved, alternate pairs of rectrices being dropped * * *.
>
> Notwithstanding the shortness or virtual lack of the tail in many diving birds, it would seem that this appendage is of real utility to the cormorants and grebes, so that its functional completeness is preserved even during the period when the adult snakebirds are flightless.

Considerable variation in color occurs in this species. A female from Lake Edward, eastern Belgian Congo (M.C.Z. 98066) represents one extreme. It has a broad, distanct black band on either side of the head and neck just above the white band, beginning back of the eye and extending nearly to the base of the long neck, giving the head and neck a quadricolored appearance laterally, dark brown above, then a band of black, then white, and then lighter brown below. The other extreme is shown by a female from Dar-es-Salaam, Tanganyika Territory (M.C.Z. 133065). In this bird there is no indication of a black stripe and no brownish color on the underside of the head and neck, giving a bicolored appearance laterally, dark grayish brown above and white below. Both birds are adults.

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[17] Journ. f. Ornith., 1923, Sonderheft, p. 31.

Granvik[18] comments at some length on the variations in immature plumages. He writes, however, that adults have the "* * * inner web of the last secondary supplied with a cross fold (like that on the outer web of the tail feathers)." This is doubtless a slip of the pen as the innermost (last) secondaries are transversely striated only on their outer webs.

Of the two specimens in the present collection, one, U.S.N.M. 218283, has the chin, throat, and lower neck completely washed with pale cinnamon, while the other, U.S.N.M. 218282, has these parts white.

Order CICONIIFORMES

Family ARDEIDAE

ARDEA CINEREA CINEREA Linnaeus

Ardea cinerea LINNAEUS, Syst. Nat., ed. 10, p. 143, 1758: Europe; restricted type locality, Sweden.

Mearns noted a few individuals of the African gray heron on the Hawash River, January 26 to February 13. Judging by the accounts given by Heuglin, Neumann, Erlanger, and others, it seems that this bird must be rather local and uncommon in northeastern Africa.

ARDEA MELANOCEPHALA Vigors and Children

Ardea melanocephala VIGORS and CHILDREN, in Denham and Clapperton Trav. 2, App. 21, p. 201, 1826; probably near Lake Chad.

Speciments collected:

Male adult, Ethiopia, March, 1912.

The single specimen collected is in fine adult plumage. Unfortunately it has neither definite locality nor date. It was collected by Mr. Childs Frick, probably in Sidamo Province.

A long series of specimens from various parts of Africa (South Africa, Belgian Congo, Tanganyika Territory, Kenya Colony, Uganda, Sudan, Ethiopia, and Cameroon), shows no variations other than individual ones. There seems to be no constant difference in size between the two sexes.

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[18] Journ. f. Ornith., 1923, Sonderheft, p. 30.

On the journey from Errer to Sadi Malka, this species was occasionally seen; at Loco, March 15–17, 4 birds were noted; Abaya Lakes, March 18–26, 38 were seen; then no more were met with until August 23 when 2 were found on the Thika River; at the junction of the Thika and Tana Rivers 10 birds were seen August 23–26; west of Ithanga Hills, August 28, 2; Athi River, August 31 and September 1, 5 birds were noted.

ARDEA GOLIATH Cretzschmar

Ardea goliath CRETZSCHMAR, in Rüpp. Atlas, p. 39, pl. 36, 1829: Bahhar Abiad, i. e., White Nile.

A very large heron seen at Sadi Malka is entered as "*A. goliath?*" in Mearns' diary. A few goliath herons were noted on the Hawash River January 26 to February 13; six on the Thika River August 23–26; four on the Athi River August 31 and September 1. None were collected. It is all the more unfortunate that northeast African material is not available for study as Neumann[19] says that birds from tropical east Africa have darker necks and crown patches than the more northern ones, and that further material may show them to be subspecifically distinct.

PYRRHERODIA PURPUREA PURPUREA (Linnaeus)

Ardea purpurea LINNAEUS, Syst. Nat., ed. 12, vol. 1, p. 236, 1766: "In Oriente."

The purple heron, of which no specimens were collected, was recorded by Mearns as follows: Hawash River, January 26 to February 13, occasional; Abaya Lakes, March 19–26, 18 birds seen. The species is a very widely distributed one and does not break up into local forms on the African continent. The Madagascan birds are subspecifically distinct, and are known as *madagascariensis* Van Oort.

CASMERODIUS ALBUS MELANORHYNCHUS (Wagler)

Ardea melanorhynchos WAGLER, Syst. Av. Additamenta (last page), 1827: Senegambia.

Specimens collected:

Female adult, Black Lake Abaya, Ethiopia, March 24, 1912.
Female adult, Lake Abaya, Ethiopia, March 17, 1912.

Soft parts: Iris pale yellow; bill all yellow, naked sides of face and eye ring yellowish green; legs and feet black.

Birds from the African mainland and from Madagascar are identical.

The European form, typical *albus*, does not seem to migrate farther south than northern Africa (Tunis, Algiers, Morocco,

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[19] Journ. f. Ornith., 1904, p. 339.

Egypt), and all records of this species from tropical Africa are probably referable to *melanorhynchus.*

Gyldenstolpe[20] lists a specimen from Kabare, south of Lake Edward, eastern Belgian Congo, as *C. albus albus* but notes that the legs were black. The typical form *albus* has the bare portion of the tibia yellow and only the tarso-metatarsus black, whereas both are black in *melanorhynchus.*

Van Someren[21] lists the species without any subspecific determination and calls it the "European white heron," and writes that it is a winter visitor, not resident in Kenya Colony. In this he is probably mistaken. However, many wading birds seem to have a partial migration according to the rains and the consequent inundation or drying up of suitable spots, which, coupled with the belief that the species was a European one might readily have led Van Someren to assume the white herons were migratory in the usual sense of the term.

Hartert[22] has discussed the races of this species in detail and recognizes *melanorhynchus.* Oberholser, however,[23] considers African specimens of *Casmerodius albus* to be the same as European and central Asiatic birds and writes that the "colors of the bill, tarsus, and bare portion of the tibia, which have been sometimes used as specific distinctions, are more or less unsatisfactory for this purpose, because of very great seasonal changes; and until more is known regarding the actual process and sequence of these changes it is not safe to use the colors of these parts as diagnoses."

Both specimens collected by the Frick expedition have the long nuptial plumes well developed, and lightly tinged with straw yellow. Aside from these two birds, the species was met with as follows: Abaya Lakes, March 18–26, 21 seen; Lake Rudolf, July 5–8, 500 birds; southeast of Lake Rudolf, July 10–11, 29 seen; Tana River, August 15, 2; Athi River, August 31, 1 bird seen.

EGRETTA GARZETTA GARZETTA (Linnaeus)

Ardea garzetta LINNAEUS, Syst. Nat., ed. 12, vol. 1, p. 237, 1766: "In Oriente."

Specimens collected:

Male adult, east shore Lake Rudolf, Kenya Colony, July 5, 1912.

Female adult, south tip of Lake Rudolf, Kenya Colony, July 7, 1912.

Soft parts: iris yellowish white; legs and feet black, yellow on underside of toes, and yellow spots on tops of toes, claws and bill dusky grayish, palest at base of mandible.

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[20] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 293.

[21] Nov. Zool., vol. 29, 1922, p. 9.

[22] Vögel der Paläarktischen Fauna, vol. 2, pp. 1236–1239.

[23] Auk, vol. 36, 1919, pp. 557–558.

The upper sides of the toes in the male specimen are much lighter (in dried condition) than in the female. In the latter the toes are dorsally exactly like the tarsi in color (in dried condition), much like the condition found in the Australian form *nigripes* Temminck, yet Mearns described this specimen as having the tops of the toes spotted with yellow when fresh. The colors of *nigripes* had best be determined from fresh material.

Comparison of a fair series of African specimens with an equal number of Chinese birds reveals no differences of systematic importance.

Both specimens collected have the long dorsal plumes, but the male lacks the occipital plumes which are present in the female and has the breast plumes better developed than in the latter. A pair from Tanganyika Territory present exactly the opposite state of affairs. The male has a longer bill than any other individual examined, the culmen measuring 91 millimeters. The female has a culmen of 78 millimeters, and is much smaller in all its dimensions than the male.

Aside from the birds collected at Lake Rudolf, Mearns noted 20 individuals at Black Lake Abaya, Ethiopia, March 18–19. The little egret appears to be rare in Ethiopia as neither Neumann nor Erlanger observed or collected any in that country.

BUBULCUS IBIS (Linnaeus)

Ardea ibis LINNAEUS, Syst. Nat., ed. 10, p. 144, 1758: Egypt.

Specimens collected:

Male adult, Lake Abaya, Ethiopia, March 18, 1912.
Adult unsexed, Lake Abaya, Ethiopia, March 18, 1912.
Female adult, Lake Abaya, Ethiopia, March 17, 1912.
Male adult, east Lake Stefanie, Kenya Colony, April 20, 1912.
Female young, Dussua (latitude 3° N.), Kenya Colony, July 2, 1912.

The adult male from Lake Abaya is acquiring the breeding plumes on the head and back, as is also the female, while the unsexed bird from the same place is in full breeding plumage. The colors of the soft parts of these birds are recorded as follows: Iris and bill yellow; tibia yellowish; tarsi and toes olive; claws olive brown. Females have the buffy dorsal plumes, breast patch, and top of the head somewhat darker than do males. Judging by the intensity of the coloration of these feathers, the unsexed bird from Lake Abaya seems to be a female.

A long series (51 specimens) from various parts of continental Africa and Madagascar shows no variations other than individual or due to age, sex, or wear. The following table of measurements will give an idea of the size variation found in this species.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Sudan, Blue Nile, Aradeiba		251	91.0	59.0	87.0
Kenya Colony:					
East Lake Stefanie	♂	235	91.0	56.0	74.0
South Guaso Nyiro River	♂	243	86.5	56.0	72.5
Lake Victoria	♂	243	89.0	63.0	78.0
Kabalolot, Sotik district	♂	234	93.0	54.0	80.0
Tanganyika Territory:					
Dar-es-Salaam	♂	238	90.0	59.0	76.0
Morogoro	♂	237	87.5	56.5	75.0
Belgian Congo Kamaniola	♂	246	91.5	55.0	75.0
Cameroon, Sakbayeme	♂	245	90.5	56.0	77.0
Madagascar:					
20 kilometers northeast of Tulear	♂	242	94.5	53.0	79.0
60 kilometers west-northwest of Antsirabe	♂	231	94.0	56.5	77.0
Uganda:					
Rhino Camp	♂	250	90.0	58.0	79.0
Do	♂	245	93.0	58.0	73.0
Ethiopia:					
Lake Abaya	♂	244	93.0	58.0	78.0
Do	♀	230	86.0	58.0	78.0
Kenya Colony:					
Naivasha	♀	240	88.0	50.0	73.0
Do	♀	237	88.0	56.0	74.0
Do	♀	247	82.0	53.5	75.0
Do	♀	239	81.0	54.0	75.0
Do	♀	235	83.0	57.0	70.0
Uganda:					
Butiaba	♀	240	90.0	56.0	73.0
Rhino Camp	♀	244	92.0	60.0	71.0
Madagascar:					
Miandrivazo	♀	240	93.0	54.0	72.0
Do	♀	242	92.5	53.0	73.0
Morondava Delt	♀	240	92.0	56.0	70.0

Specimens from Madagascar average slightly longer (2 millimeters) tails than mainland birds but the extremes of each group overlap.

The color of the legs and feet is subject to a rather inexplicable type of variation. The majority of individuals have the bare portion of the tibiae and the tarsi grayish yellow and toes darker, sometimes almost blackish. However, the male from Lake Abaya, as recorded above, had the tibiae yellow, the tarsi and toes olive, while a male in full breeding plumage from Victoria Nyanza, Kenya Colony, has the tarsi recorded by the collector (W. R. Zappey) as light yellow. Granvik [24] notes that in an immature female collected by him at Kavirondo Gulf, Victoria Nyanza, the bare parts of the tibiae were saffron yellow, but the tarsi and toes were black. This I find is not characteristic of most immature birds.

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[24] Journ. für Ornith., 1923, Sonderheft, p. 47.

In some individuals the tail is slightly forked; that is, the lateral rectrices are a few millimeters longer than the median ones, but in the majority of specimens the tail is square.

Bubulcus coromandus (Boddaert) is often considered as a race of *B. ibis*, as, for example, in Hartert's "Vögel der Paläarktischen Fauna"[25] but there seem to be no intermediates known between *coromandus* and *ibis* and therefore they may as well be considered specifically distinct.

The cattle heron is widely distributed over the African continent, southern Europe, and western Asia, and is remarkably uniform in size and color throughout its enormous range. Erlanger[26] found it to be very common in Gallaland and Shoa. Mearns noted it in numbers at the following places: Black or North Lake Abaya March 18–20, 128 birds; Lake Rudolf July 5–8, 100 seen; Le-se-dun July 26, 4 seen; Lekiundu River, August 1, 8 birds.

ARDEOLA RALLOIDES (Scopoli)

Ardea ralloides Scopoli, Annus I. Hist.-Nat. p. 88, 1769: Carniola.

Specimens collected:

One unsexed, Ourso, Ethiopia, October 25, 1911.

The single specimen collected is not fully adult as it has black shafts in the primaries and has some of the rectrices washed with grayish. Otherwise it resembles the winter plumage of the adult. The variations in size of this species are indicated by the following measurements. Judging by its size the present specimen seems to be a male.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Kenya Colony, Athi River	♂ adult	238. 0	93. 0	64. 5	60
Sudan, Renk:					
White Nile	do	214. 0	77. 0	66. 0	57
Do	do	203. 0	70. 5	64. 0	57
Kenya Colony, Naivasha	♂ immature	198. 0	64. 0	64. 0	53
Tanganyika Territory:					
Kilosa	do	215. 0	79. 0	61. 0	61
Do	♀ immature	187. 0	69. 0	58. 5	51
Kenya Colony:					
Athi River	do	207. 0	71. 5	57. 0	56
Naivasha	♀ adult	195. 0	70. 5	59. 0	53
Italy	do	202. 0	74. 0	60. 0	56
Ethiopia, Ourso	Unsexed, immature.	225. 0	75. 0	65. 0	63
Gambia	do	211. 5	75. 5	63. 0	59

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[25] Vol. 2, p. 1244.

[26] Journ. f. Ornith., 1905, p. 108.

The Ethiopian specimen is darker above than the bird from Gambia and has the yellowish stripes in the scapulars better developed. It is also considerably darker, grayer on the back than either of the pair from Tanganyika Territory; in fact it has this part almost as dark as immature specimens of *Ardeola idae*.

Ardeola ralloides and *Ardeola idae* have been seriously confused by students of African birds, and inasmuch as the ranges of the two are not as distinct geographically as hitherto thought, it is all the more important to know the differences between them. In my study of these birds I have been greatly aided by advice and suggestions offered by Dr. J. P. Chapin, who, indeed, supplied the key to the whole problem. It has long been known that the Madagascan form *idae* occasionally occurs in continental Africa. In the immature and the adult nonbreeding plumages (of both sexes) *idae* is much darker above than *ralloides*. *A. idae* breeds only in Madagascar, and occurs on the mainland of Africa only in young or "winter" plumage as far as I know. Some recent writers[27] have considered *idae* and *ralloides* specifically distinct on account of the continental records of the former. While I agree in considering them species, the reason, as is shown below, is somewhat different.

It is rather surprising how far inland the Madagascan bird does wander. Van Someren[28] procured specimens at Nairobi and Kijabe in July and October. He comments that it is a rare bird in those parts and rather remarkable so far from the Indian Ocean. Granvik[29] shot an adult male on the eastern slopes of Mount Elgon in eastern Uganda at an altitude of 7,000 feet. This is by all odds the farthest inland the race has been taken and the bird is undoubtedly an accidental straggler in the Elgon district. However, when we consider the postnuptial wanderings of egrets and other herons in the United States, the distances involved in the present case lose much of their apparent magnitude.

It is the Madagascan birds that are puzzling and that form the center of the problem. It has always been supposed that all Madagascan squacco herons were *idae*, but a series of 21 birds collected on that island by F. R. Wulsin clearly shows that both *ralloides* and *idae* occur side by side there. Of his 21 specimens, only 6 are *idae*, and 15 *ralloides*. Unfortunately, all the specimens of *idae* and all but one of *ralloides* are either immature or in off-season plumage. The six *idae* are very much darker above than any of the *ralloides* and average somewhat longer wings than the latter. The breeding plumage of *idae* is said to be pure white, as shown in Grandidier's great work on the natural history of Madagascar. (Pl. 226.) Hartert [30] remarks that the specimen on which this plate was based should be examined lest the identification may be wrong. Sharpe [31] examined some herons from Madagascar and found that two species had been confounded under, "* * * the heading of * * * *idae.* A white bird in breeding plumage, in Professor Newton's collection, agrees very well with the plate of the adult *A. idae* in the 'Historie Naturelle de Madagascar,'" and he "* * * can not see why the bird is not *Garzetta garzetta.*"

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[27] Van Someren, Nov. Zoöl., vol. 29, 1922, p. 10, and Granvik, Journ. f. Ornith., 1923, Sonderheft, p. 46.

[28] Nov. Zool., vol. 29, 1922, p. 10.

[29] Journ. f. Ornith., 1923, Sonderheft, p. 46.

In response to an inquiry of mine regarding the white heron labeled *idae*, on which Grandidier's plate was based, and which is now in the Paris Museum, M. Berlioz has very kindly informed me that the specimen in question is certainly not an example of *Egretta garzetta.* Whether it is an albino *Ardeola* or something else is not clear, but it appears to be a normal bird. Fortunately for our present interest, it is not the type, so its correct identification, while desirable, in no way affects the nomenclature of the Madagascan squacco heron. However, M. Berlioz noted that there were some dark feathers in the back of one of the white birds in the Paris Museum. Doctor Chapin has examined the series with which I have had to work, and writes me that, "* * * the conclusion at which I have arrived is that *Ardeola ralloides* is probably not divisible into races; that it inhabits the island of Madagascar as well as the continent of Africa. *Ardeola idae*, on the other hand, is a distinct species, with considerable resemblance to *ralloides* when young, but becoming nearly pure white when adult. This was the belief of Milne-Edwards. It is supported by the fact that Berlioz found vestiges of dark-colored feathers in the back of one of the white specimens in the Paris Museum, and, finally, it is proved by the specimen in the Museum of Comparative Zoölogy, a male, No. 77447. This bird is molting and the new feathers coming in on the crown and sides of the neck are buffy white, with no trace of dark markings. On the nape there are about eight narrow, pointed feathers, not yet fully grown, but pure white. On the lower foreneck there is a patch of new white feathers growing out, with decomposed webs; also, on the back, new feathers are appearing, buffy white in color, with decomposed webs. This bird, in another month or so, would have been white, with a buffy wash on the crown and the back, but this buff tinge might quickly bleach out, so that the bird would look white." An adult in the United States National Museum, recorded by Oberholser[32] as *Ardeola xanthopoda*, is white, with a few dusky feathers hidden among the white ones.

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[30] Vög. pal. Fauna, p. 1247.

[31] Cat. Birds Brit. Mus., vol. 26, 1898, p. 207.

There remains the possibility that the *ralloides* breeding in Madagascar may be a separable race from the typical African, European, and west Asiatic one. I have not sufficient material to decide this, but the following notes are of interest: The only Madagascan *ralloides* in breeding plumage is noticeably more richly vinaceous on the back and more deeply rufescent on the sides and the hind neck than one from Italy and another from Palestine. However, the latter two birds are probably females, while the Madagascan example is a male, which may account for its brighter, more intense coloration. Also, the latter has longer occipital plumes, more widely margined with black, than either the Palestinian or the Italian example.

BUTORIDES STRIATUS ATRICAPILLUS (Afzelius)

Ardea atricapilla AFZELIUS, Kongl. Vet.-Akad. nya Handl. Stockh., vol. 25, p. 264, 1804: Sierra Leone.

Specimens collected:

Adult, unsexed, Ourso, Ethiopia, September 17, 1911.
Adult female, Hawash River, Ethiopia, February 8, 1912.
Immature male, Lekiundu River, Kenya Colony, August 7, 1912.

These three specimens are *atricapillus*, not *brevipes*. It seems that the latter race (said to be distinguished by its more grayish, less greenish sheen to the interscapulars and scapulars, and the more brownish tinge to the nape) is confined to the lowlands of the Red Sea coast and does not get into the higher plateau country of Ethiopia. However, one specimen, a female from Hawash River, is slightly intermediate between *atricapillus* and *brevipes*, having the scapulars and interscapulars less greenish, more bluish gray than other comparable specimens from Ethiopia, Kenya Colony, Tanganyika Territory, Mozambique, Belgian Congo, and Cameroon, but the difference is slight and may be accounted for by individual variation or by the amount of "bloom" on the feathers.

In his review of the races of this heron,[33] Hartert lumps Madagascan birds with continental specimens of *atricapillus*. The Madagascan series in the Museum of Comparative Zoölogy indicates that these birds are subspecifically distinct. They should be known as *B. s. rutenbergi*, a conclusion in which I am anticipated by Sclater.[34] *B. s. rutenbergi* is smaller than *atricapillus*, although there is some overlapping in size as the following tables indicate.

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[32] Proc. U. S. Nat. Mus., vol. 22, 1900, p. 237.
[33] Vögel der Paläarktischen Fauna, vol. 2, p. 1250.
[34] Syst. Avium Ethiopicarum, 1924, p. 28.

Butorides striatus atricapillus

Locality	Sex	Wing	Tail	Culmen	Tarsus
Kenya Colony:					
Lekiundu River	♂ immature	178. 0	66. 0	61. 0	50. 0
Athi River	do	167. 5	63. 0	61. 5	44. 0
Do	♂ adult	178. 0	66. 0	61. 5	46. 0
Tanganyika Territory, Dar-es-Salaam.	do	166. 0	58. 0	57. 0	45. 0
Mozambique, Lumbo	do	173. 5	66. 5	67. 0	48. 5
Belgian Congo:					
Lake Edward	do	178. 0	66. 0	65. 0	45. 0
Do.(?)	do	180. 0	72. 0	60. 0	44. 5
Cameroon:					
Akok	do	180. 0	67. 0	60. 0	45. 0
Sakbayeme	♀ immature	170. 0	64. 5	58. 0	45. 5
Kenya Colony, Athi River	♀ adult	171. 0	63. 5	57. 0	47. 0
Ethiopia, Hawash River	do	178. 0	65. 0	------	47. 5
Tanganyika Territory, Dar-es-Salaam.	do	172. 5	64. 5	59. 5	45. 0

Butorides striatus rutenbergi

Locality	Sex	Wing	Tail	Culmen	Tarsus
Madagascar:					
Maevetanana	♂ adult	158	54	56. 0	38. 0
Tulear	do	171	60	62. 0	45. 5
Do	♀ immature	156	52	61. 5	43. 0

Mearns observed the green-backed heron throughout his journey along the Hawash River, but not very commonly. After leaving that region he did not meet with it again until he came to the Lekiundu River, south of which (Tana and Athi Rivers) he noted single birds from time to time (August 4–31).

ARDEIRALLUS STURMII (Wagler)

Ardea sturmii WAGLER, Syst. Av., Ardea, sp. no. 37, [p. 191], 1827: Senegambia.

Specimens collected:

One unsexed, Malata, Ethiopia, June 22, 1912.

Soft parts: Iris yellow; bill dusky olive above, greenish on sides and below; feet gray brown, yellow behind and on underside of toes.

" The bird was in a rocky creek bed when shot." (E. A. Mearns.)

The specimen is not quite adult, having light brownish edgings to the feathers of the upper parts. The only comparative material in similar plumage available is a young male from Metet, Cameroon. The two birds are quite different in the following ways: The Cameroon bird is very much lighter, more bluish gray, less blackish on the upper parts, especially the head, than the Abyssinian example. The former has the margins of the feathers of the upper parts rich cinnamon rufous, while the latter has these margins pale tawny buff. The under wing-coverts are much darker in the former than in the latter and the sides of the lower part of the neck are much deeper rufous in the western individual. In size the two compare as follows:

Locality	Wing	Tail	Culmen	Tarsus
Cameroon	158	51	41. 0	41. 5
Ethiopia	162	54	40. 5	42. 0

Besides these two specimens I have examined seven adult birds from Senegal, (G. F. Simmons collection), three from Cameroon (J. A. Reis collection), and two from South Africa (Rivoli [Massena] collection). The Senegal birds have blacker bills than the others; the difference between them and the dusky-yellow-billed Cameroon specimens is very striking. Males have the streaks on the underparts darker, broader, and heavier than the females, and the ground color of the ventral surface is whiter in the males, more tawny yellowish in the females.

Family SCOPIDAE

SCOPUS UMBRETTA BANNERMANI C. Grant

Scopus umbretta bannermani C. Grant, Bull. Brit. Orn. Cl., vol. 35, p. 27, 1914: Mount Leganisho, Kenya Colony.

Specimens collected:

Two female adults, Dulutcha, Ethiopia, January 24, 1912.

Male adult, Sirre, Ethiopia, February 13, 1912.

Male and female adults, Gato River, near Gardula, 4,000 feet, Ethiopia, April 1, 1912.

Male and female adults, Gato River, near Gardula, Ethiopia, April 16, 1912.

Male adult, Lekiundu River, Kenya Colony, August 7, 1912.

Soft parts: Iris hazel; bill, legs, feet, and claws black.

The birds taken April 1, 1912 at Gato River were a mated pair according to Mearns' notes.

The typical, small, western form of the hammerkop ranges from Senegal to Nigeria. A bird from Cameroon in the Museum of Comparative Zoölogy is of the eastern form *bannermani*, but is smaller than birds from Kenya Colony and east Africa generally.

Gyldenstolpe,[35] however, records two specimens of typical *umbretta* from Cameroon (Messake River and Meme) with wings measuring 259 and 255 millimeters, respectively. A male from Ndikbo, Cameroon, before me, has a wing of 295 millimeters and is nearer to *bannermani* than to *umbretta.*

The following measurements are of interest at this point.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Cameroon, Ndikbo	♂ adult	295	155. 5	84. 0	64. 0
Tanganyika Territory, Dar-es-Salaam.	do	304	160. 0	87. 0	70. 0
Kenya Colony:					
Lekiundu River	do	319	160. 0	90. 0	70. 0
North Guaso Nyiro River	do	330	172. 0	90. 0	68. 0
Ethiopia:					
Sirre	do	325	169. 0	90. 5	69. 0
Gato River, near Gardula.	do	322	160. 0	90. 0	72. 0
Do	do	322	162. 0	92. 0	72. 0
Do	♀ adult	311	157. 0	85. 0	68. 5
Do	do	312	161. 0	88. 0	67. 5
Dulutcha	do	315		88. 0	67. 0
Do	do	313	159. 0	83. 0	69. 0
Kenya Colony:					
Athi River	do	311	152. 0	84. 0	69. 0
Fort Hall	do	311	152. 0	84. 0	66. 0
West of Mount Kenia	do	319	153. 0	81. 5	68. 0
Tanganyika Territory, Morogoro.	do	281	155. 0	82. 0	65. 5
Belgian Congo, Lake Edward.	do	320	165. 0	81. 5	65. 0
Madagascar:					
Maevetanana	do	320	166. 0	84. 0	68. 5
Miandrivazo	do	321	170. 0	87. 0	76. 0
South Africa		321	163. 0	78. 0	73. 0

It is curious to note that a male and female from Tanganyika Territory are much smaller than other East African specimens as regards the wing length.

Birds from Madagascar (five adult females, only two of which are tabulated) average slightly longer bills than mainland birds.

The number of light bars on the central rectrices varies from six to twelve in a series of 21 birds, regardless of sex or season.

The hammerhead stork was seen, usually singly, along streams from Errer to Sadi Malka. It was common along the Hawash River, January 26 to February 23; 2 were seen at Loco, March 15–17; at the Abaya Lakes, March 18–19, 16 birds were noted; at Gato River, March 29 to May 17, 10 were seen; Lekiundu River, August 4–8, 1 bird; Athi River, August 30–31, 3 seen.

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[35] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 294.

Family CICONIIDAE

CICONIA CICONIA CICONIA (Linnaeus)

Ardea ciconia LINNAEUS, Syst. Nat., ed. 10, p. 142, 1758: Europe, Asia, Africa; restricted type locality, Sweden.

Although no specimens of the white stork were obtained by the Frick expedition, Mearns recorded seeing one near a native village between Wadi Malka and Chadi Malka, December 22.

This winter visitor from Europe appears to be decidedly local in Ethiopia, much less so than in Kenya Colony. Erlanger[36] never saw it during his memorable journey, but Hilgert observed a flock of about 200 birds on the Daroli River February 23.

DISSOURA EPISCOPUS MICROSCELIS (Gray)

Ciconia microscelis GRAY, Genera Bds., vol. 3, p. 561, pl. 151, 1848: No type locality; Africa, see Reichenow, Vög. Afr., vol. 1, p. 348.

No specimens of the wooly necked stork were obtained, but the species was observed at the following places: Aletta, March 7–13, 2 seen; Loco, March 13–15, 12 birds; Abaya Lakes, March 23–26, 2 seen. Gato River, March 29 to May 17, 10 birds; Bodessa, May 18, 1 noted; Wobok, June 18, 2 seen; near Saru, June 19, 2 birds; Northern Guaso Nyiro River, July 31 to August 3 seen; Athi River, August 31, 1 bird.

The bird seen at Bodessa was found with several vultures at the carcass of a mule. Whether this stork is regularly a scavenger like *Leptoptilus crumeniferus* is an open question.

SPHENORYNCHUS ABDIMII (Lichtenstein)

Ciconia abdimii LICHTENSTEIN, Verz. Doubl., p. 76, 1823: Near Dongola, Sudan.

Specimens collected:

Adult male, Aletta, Ethiopia, March 10, 1912.

Adult male and adult female, Loku, Lake Abaya, Ethiopia, March 13, 1912.

Adult female, Loku, Lake Abaya, Ethiopia, March 15, 1912.

Adult male, Lake Abaya, Ethiopia, March 24, 1912.

Adult female, Gato River near Gardula, 4,000 feet, Ethiopia, April 19, 1912.

Soft parts: Iris dirty yellow granulated with brown; bill olive green tipped with dull red; frontal skin reddish yellow bordered with blue; chin, throat, and area in front of the eye vermillion; sides of face blue; bare tibia and tarsus black; heel joint and toes brick red; claws brownish black.

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[36] Journ. f. Ornith., 1905, p. 103.

Although this species ranges over most of tropical Africa (and even South Africa) it is chiefly found in the eastern part of the continent. Gyldenstolpe[37] writes that in August, 1921, when traveling down the Nile, he saw great numbers of this stork breeding at the outskirts of the native villages. In the Naturhistoriska Riksmuseum at Stockholm there are only two specimens of *Sphenorynchus* from western Africa, both from the lower Congo—Mukimbungu and Kingoyi. In the Museum of Comparative Zoölogy there is a male (immature) from Sakbayeme, Cameroon, which indicates by its immaturity that the species not merely occurs in West Africa but probably breeds there as well as in the eastern African countries. This Cameroon specimen has bare skin of the cheeks, lores, etc., entirely yellowish, not black as in adults; and the upper parts very dark blackish brown with very little purple sheen. The colors of the bare skin mentioned in the previous sentence are the colors in dried specimens.

Blanford[38] writes that this stork is occasionally seen in the highlands but not commonly. "About the shores of Annesly Bay it is much more frequent, and I several times saw it in the Anseba Valley. * * * I once saw five by some carcasses of mules at Komayli, doubtless attracted by the insects." Mearns also noted this bird about carcasses, but made no notes as to whether it was feeding on them or not.

EPHIPPIORHYNCHUS SENEGALENSIS (Shaw)

Mycteria senegalensis Shaw, Trans. Linn. Soc., vol. 5, p. 35, pl. 33, 1800: Senegal.

Mearns did not collect any specimens of the saddle-bill stork, but he recorded seeing a flock of 100 birds on Lake Rudolf, July 5–8, and a single bird on July 10 a short distance southeast of the lake.

Neumann[39] observed this species around Lake Zwai, the Abaya Lakes, and at Gelo. Erlanger recorded it but once during his journey, and it seems, therefore, that it is rather local in Ethiopia. But it does occur there, a fact which Sclater[40] overlooked.

LEPTOPTILOS CRUMENIFERUS (Lesson)

Ciconia crumenifera Lesson, Traité d'Orn., p. 585, 1831: Senegal.

Specimens collected:

One unsexed (head only) Lake Shala, Ethiopia, March 3, 1912.

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[37] Kungl. Sv. Vet. Akad. Handlgr., 1924, pp. 294–295.

[38] Geol. and Zool. Abyss., 1870, p. 436.

[39] Journ. f. Ornith., 1904, p. 338.

[40] Syst. Avium Ethiop., 1924, p. 34.

The specimen collected (only the head) has a larger bill than any of a series from Kenya Colony. The culmen in this bird measures 316 millimeters and at the base the bill is 80 millimeters deep. The largest Kenya measurement is as follows: Culmen 310 millimeters, depth of bill at base, 79 millimeters.

Mearns observed the marabou stork in the following localities during the course of the expedition. A few were seen between Bilan and Sadi Malka, none at Dire Daoua, although he was told of their presence near the latter city. At Sadi Malka the species was rare, but on the upper Hawash River it was seen everywhere in flocks of 50 or more, usually about native settlements. At Loco, March 15–17, 2 were seen; Abaya Lakes, March 18–26, 136 birds noted; near Gardula, March 26–29, 10 seen; Gato River, March 29 to May 17, 100 seen; Wobok, June 18, 100 seen (in one flock); near Saru, June 19, 10 birds; Karsa Barecha, June 21, 25 seen; upper Chaffa village, June 24, 10 birds; Chaffa, June 24–25, 20 seen; Hor, June 26–30, 10 seen; Lake Rudolf, July 5–8, 100 birds; Thika River, August 23, 1 seen; Athi River, August 31 to September 2, 11 birds observed.

IBIS IBIS (Linnaeus)

Tantalus ibis LINNAEUS, Syst. Nat., ed. 12, vol. 1, p. 241, 1766: Egypt.

Wood ibises were met with in two localities by the Frick expedition—North or "Black" Lake Abaya, March 18, where 12 birds were seen, and on Lake Rudolf, July 5–8, where 1,000 were observed. No specimens were taken in either place. Neumann[41] writes that this stork appears to be less common in northeastern Africa than in Kenya Colony and Tanganyika Territory.

Family THRESKIORNITHIDAE

THRESKIORNIS AETHIOPICUS AETHIOPICUS (Latham)

Tantalus aethiopicus LATHAM, Ind. Orn., vol. 2, p. 706, 1790: Ethiopia, probably Egypt (cf. Bruce, Travels, vol. 5, append. 1, p. 172, pl. 35, 1790).

Specimens collected:

Adult male, east of Saleish, Ethiopia, January 19, 1912.

Adult female, Hor, latitude 3° 19′ N., Kenya Colony, June 30, 1912.

A series of 17 specimens from Ethiopia, Kenya Colony, Uganda, and Tanganyika Territory indicates the limits of size variation for the species as the following table shows. Only the adults are tabulated.

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[41] Journ. f. Ornith., 1904, p. 338.

Locality	Sex	Wing	Tail	Culmen	Measured by—
Uganda, Rhino Camp	♂	375	142. 0	169	E. A. Mearns.
Kenya Colony:					
Naivasha	♂	385	145. 0	158	Do.
Do	♂	381	139. 0	183	Do.
Ulukenia Hills	♂	391	143. 0	168	Do.
10 miles northwest Kisumu.	♂	354	141. 0	135	H. Friedmann.
Ethiopia, east of Saleish	♂	395	150. 0	153	Do.
Uganda, Rhino Camp	♀	376	141. 0	149	E. A. Mearns.
Kenya Colony:					
Naivasha	♀	382	148. 0	146	Do.
Do	♀	365	145. 0	142	Do.
Do	♀	378	146. 5	147	Do.
Do	♀	364	136. 0	141	Do.
Nairobi	♀	357	148. 0	143	H. Friedmann.
Hor	♀	355	130. 0	141	Do.
Tanganyika Territory, Tindiga.	♀	346	142. 0	139	Do.

A male, not fully adult, from Tindiga, Tanganyika Territory, surpasses all of these birds in the size of the culmen. Its measurements are: Wing, 376; tail, 144; culmen, 185 millimeters. Granvik[42] gives the following measurements for a full-grown male taken at Kendu, Kavirondo Gulf, Kenya Colony: Wing, 385; culmen, 170 millimeters.

The specimens listed above as measured by Mearns have not been examined by me but the wing lengths are probably too great. My measurements are made from the bend of the wing to the tip of the longest primary, while it seems that Mearns measured to the tip of the longest tertial. The tertials are so frayed out that they must be unusually subject to wear and, therefore, I have not considered their length as a reliable size criterion.

In immature birds the head and neck are feathered; the feathers on the chin, throat, and underside of the neck are mostly white with a very few dark gray-black ones showing here and there, while the feathers of the dorsum of the head and neck are gray-black much mixed with whitish, especially on the crown where each one is completely edged with white.

The extent of the dark coloration on the tips of the outermost primaries varies individually. In some specimens it extends farther back on the outer than the inner webs, in others the reverse is true, while in still others the distribution is equal in both webs. Sex and age have nothing to do with these differences.

The birds from Ethiopia and northern Kenya Colony (Hor and Kisumu) have the innermost secondaries and the tertials much more purplish in color than do specimens from southern Kenya Colony

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[42] Journ. f. Ornith., 1923, Sonderheft, p. 43.

(Naivasha and Nairobi) and from Tanganyika Territory. The difference is not one of age, as I have seen both immature and adult birds from Tanganyika Territory and they agree in having these feathers bluish rather than purplish.

A male in fresh plumage from Rhino Camp, West Nile, Uganda (U.S.N.M. 216076) is intermediate between Abyssinian and east African (Kenya) birds in the amount of purplish.

Birds in breeding condition often (perhaps always)[43] have the long feathers on the flanks and some of the outer wing coverts pale yellowish or straw color.

The greenish gloss on the tips of the remiges sometimes wears or fades away leaving the feathers brown instead. This seems to happen more frequently on the three outermost primaries and the outermost secondaries than on any of the others.

According to Zedlitz[44] the breeding season of this bird in northern Ethiopia begins not earlier than May, while Erlanger judged that in southern Ethiopia it starts about the end of March. Unfortunately Mearns made no note of the condition of the gonads in his specimens.

The Madagascan race *bernieri* Bonaparte is very distinct, almost specifically so. The Aldabra race *abbotti* Ridgway is also valid.

Besides the actual specimens collected, the species was observed as follows:

Ethiopia: East of Saleish, January 19, few noted; Hawash River, January 26 to February 13, a few single birds here and there; Black Abaya Lake, March 18–19, 24 seen.

Kenya Colony: Hor, lat. 3° 19′ N., a solitary individual seen and wounded on June 28, and one collected two days later; Lake Rudolf, flock of 100, July 5; 25 miles southeast of Lake Rudolf, 4 seen, July 12.

It is rather curious that Mearns did not record this ibis south of the Lake Rudolf district as the bird comes in great numbers to the lakes of the Rift Valley, such as Naivasha, Nakuru, Elmenteita, Baringo, and Huntington, during July and August, and is common even away from water although more numerous around lakes than in drier parts.

HAGEDASHIA HAGEDASH NILOTICA Neumann

Hagedashia hagedash nilotica NEUMANN, Ornis, vol. 13, p. 193, 1909: Kimo, near Adis Abeba, Ethiopia.

Specimens collected:

Adult male, Botola, Sidamo, Ethiopia, March 5, 1912.

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[43] According to Van Someren, Nov. Zool., vol. 29, 1922, p. 8; and Granvik, Journ. f. Ornith., 1923, Sonderheft, p. 43.

[44] Journ. f. Ornith., vol. 48, 1910, p. 327.

The single specimen collected agrees with Neumann's description of this race and with three specimens from Kavirondo Gulf, Kenya Colony. It measures as follows: Wing, 389; tail, 175; culmen (chord), 156 millimeters. Although in general it may be true that the bill in this race is longer than in its southern neighbor *erlangeri*, some specimens of the latter form are considerably larger than average specimens of the former. Neumann has pointed out that birds from Lake Nyasa and the Uhehe country have much longer bills than typical *erlangeri* to which form they belong on geographic grounds. A specimen from Kipera, near Kilosa, Tanganyika Territory, in the Museum of Comparative Zoölogy agrees with the Uhehe measurements. However, these birds may be intermediate between *erlangeri* and *nilotica*. Sclater [45] seems to have sensed the intermediate character of these birds when he gave the range of *nilotica* as "* * * south to Uganda and perhaps to the country north of Lake Nyasa."

Specimens of this ibis from the Kavirondo Gulf region of Kenya Colony and of eastern Uganda are not typical *nilotica* as they are lighter on the underparts than Ethiopian birds. This is to be expected, however, where *nilotica* and *erlangeri* come together. In fact, while Van Someren [46] records *nilotica* from Masindi and Entebbe, Uganda, he writes that he has provisionally recognized this race but is unable to appreciate the differences between these birds and east African specimens. Typical *erlangeri* he records from Lake Jipe, Tanganyika Territory, and Naivasha, Kenya Colony. As far as I know, *nilotica* is known in Kenya Colony only from the Kavirondo Gulf region but it undoubtedly occurs northward to Turkanaland, although not definitely recorded from there. Granvik [47] found it common at Kendu in the Kavirondo country.

The material at hand (19 specimens) supports Neumann's conclusions and represents all four races of this ibis. The characters used in the diagnoses of the subspecies are the length of the culmen and the intensity of the coloration; that is, darkness and lightness. Reichenow [48] has studied the abundant material in Berlin and reports it difficult to tell the races apart, as the length of the culmen varies with age and sex and because the color, particularly of the underparts, also varies to some extent. Granvik [49] notes that of two specimens shot by him on the same day at Kendu, one, a male, is dark gray, and the other, a female, is light grayish brown. All this only means that, in making comparisons, adult birds should always be compared with adults of the same sex. In such cases Neumann's diagnoses will probably be substantiated.

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[45] Syst. Avium Ethiop., 1924, p. 36.
[46] Nov. Zool., vol. 29, 1922, p. 8.
[47] Journ. f. Ornith., 1923, Sonderheft, pp. 43–44.
[48] Mitt. Zool. Mus. Berlin, 1910–11, p. 74.
[49] Journ. f. Ornith., 1923, Sonderheft, p. 44.

Neumann[50] writes that in most examples of *nilotica* the warts in the lores are better developed than in other forms. The material at hand not only fails to corroborate this but indicates in a very definite manner that this character is subject to individual, and possibly, age, variation in all four races.

Of the typical South African race, I have seen but one specimen, which I collected in central Natal in 1924. It disagrees with Neumann's diagnosis in that the wing coverts have considerable metallic sheen, although the sheen is more pinkish, less greenish than in any other specimen examined. However, the race is justified by the grayish neck, and my bird may be exceptional in the wing coverts, as Gyldenstolpe[51] examined four specimens in the Naturhistoriska Riksmuseum in Stockholm and found them to agree with Neumann's description even in the color of the wing coverts.

The West African race *guineensis* is very dark and ranges east as far as the Semliki Valley, but in the Toro and Ankole districts of Uganda intermediates are found which combine to some extent the character of *guineensis*, *nilotica*, and *erlangeri*, but particularly of the first two.

Whether *Hagedashia brevirostris* (Reichenow) (southern Cameroon) is distinct from *H. hagedash guineensis* is not too well established, although both Neumann and Gyldenstolpe regard it as a distinct species.

The Hadada Ibis was noted as follows:

Ethiopia: Botola, Sidamo, March 5, 1; Loku, near Lake Abaya, March 13-15, 2; Gidabo River, March 15-17, 3.

Kenya Colony: Juja Farms (near Athi River), August 30, 1; Athi River, August 30 to September 1, 4.

BOSTRYCHIA CARUNCULATA (Rüppell)

Ibis carunculata RÜPPELL, N. Wirb. Vög., p. 49, pl. 19, 1837: Taranta Mountains, Ethiopia.

Specimens collected:

Adult male and adult female, Adis Abeba, Ethiopia, December 31, 1911.

Adult male, Alaltu, Ethiopia, January 15, 1912.

Three adult males and 1 adult female, near Saleish, Ethiopia, January 18, 1912.

Adult male, Gardula, Ethiopia, 7,000 feet, April 20, 1912.

The female from Adis Abeba is mounted and on exhibition. The rest of the series present the following measurements:

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[50] Ornis, vol. 13, p. 193, 1909.

[51] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 297.

Locality	Sex	Wing	Tail	Culmen
Adis Abeba, Ethiopia	♂	374	168	124
Alaltu, Ethiopia	♂	370	170	127
Near Saleish, Ethiopia	♂	368	162	123
Do	♂	374	166	122
Do	♂	358	160	123
Gardula, 4,000 feet, Ethiopia	♂	371	165	125
Near Saleish, Ethiopia	♀	367	164	127

The wattled ibis is a bird of the Abyssinian highlands although it may possibly occur rarely in the lowlands. Reichenow[52] lists it from the " abessinische Küste " which, of course, refers to the Somali coast. However, Neumann[53] writes that it is a characteristic species of the higher mountains, never occurring below about 2,300 meters (7,700 feet) and going as high as 3,100 meters (9,300 feet). Zedlitz[54] quotes Reichenow's record for the seacoast and writes that he has never seen it there but only in the mountains. Erlanger[55] says that this ibis is very common, " almost a daily sight," in the highlands, and his silence about the lowlands is strong presumptive evidence that he did not observe it there.

According to Erlanger the breeding season is in July. Without more material it is difficult to say whether or not this species has a prenuptial molt, but the male collected on April 20 is molting slightly in the tail and wings, and has slightly wider grayish margins on the feathers of the crown than in December and January specimens, indicating less wear and, hence, probably more molting of those parts.

PLATALEA ALBA Scopoli

Platalea alba Scopoli, Del. Flor. et Faun. Insubr., vol. 2, p. 92, 1786: Luzon! (from Sonnerat), probably the Cape of Good Hope.

White spoonbills, probably of this species, were noted by Mearns on Lake Rudolf, where, on July 5–8, he saw 100 birds. No specimens were taken, so the identification can not be supported by material evidence.

Family PHOENICOPTERIDAE

PHOENICOPTERUS RUBER ANTIQUORUM Temminck

Phoenicopterus antiquorum Temminck, Man. d'Ornith., ed. 2, vol. 2, p. 587, 1820: Europe.

No specimens of the flamingo were taken, but great flocks were observed along the Suez Canal.

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[52] Vögel Afrikas, vol. 1, p. 325, 1901.

[53] Journ. f. Ornith., vol. 52, 1904, p. 337.

[54] Idem, vol. 58, 1910, p. 328.

[55] Idem, vol. 53, 1905, pp. 98–99.

The greater flamingo appears to be rare in Ethiopia, the smaller *Phoeniconaias minor* being the common species in that country. Thus, Neumann[56] writes that at Hora Schale only one of the greater flamingo was observed among countless thousands of the lesser species.

Order ANSERIFORMES

Family ANATIDAE

ANAS UNDULATA RÜPPELLI Blyth

Anas rüppelli BLYTH, Journ. Asiat. Soc. Beng., vol. 24, p. 265, 1856: "Central Africa," i. e., Inner N. E. Africa (Neumann).

Specimens collected:

Two adult males, Arussi Plateau, Ethiopia, February 14, 1912.
One adult unsexed, Arussi Plateau, Ethiopia, February 14, 1912.
One adult male, Arussi Plateau, Ethiopia, February 16, 1912.
One unsexed, Arussi Plateau (10,000 feet), Ethiopia, February 26, 1912.

The species *Anas undulata* ranges over a great portion of the African continent with surprisingly little local variation. The two recognized races, the typical, southern *undulata*, and the northeastern *rüppelli*, are only barely separable, not too well defined.

There has been a curious misunderstanding about these races.

Blyth described *rüppelli* in 1856 as a species. When working over the ducks for the Catalog of Birds in the British Museum in 1895, Salvadori decided the form was not valid. It remained as a synonym until 1904 when Neumann[57] got together a good series of both northern and southern birds, found a slight difference between them, and reinstated *rüppelli* as a race of *undulata.*

Doctor Phillips, in his monograph of the ducks, does not recognize *rüppelli* and calls all the birds *undulata.* Sclater[58] however, follows Neumann and recognizes the two forms.

Reichenow[59] took Neumann's results and carelessly transposed them, giving *undulata* the characters of *rüppelli* and vice versa. Then Sassi, reporting on the birds collected by Grauer in the eastern Belgian Congo[60] reported a South African specimen with green specula, evidently under the impression that the southern birds had bluish specula. He obviously had the characters of the two races transposed following Reichenow. Phillips, noting the comment of

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[56] Journ. f. Ornith., 1904, p. 338.

[57] Idem, 1904, p. 327.

[58] Syst. Avium Ethiopicarum, 1924, p. 42.

[59] Vögel Afrikas, vol. 3, Nachtrag, 1905, p. 800.

[60] Annalen k. k. Naturhist. Hofmuseum. Wien, vol. 26, 1912, p. 358.

Sassi's, expressed himself as follows:[61] "In view of the fact that the speculum color appears to be a character of very doubtful value, and because birds with green specula have been noted in South Africa * * * I have thought it best not to recognize *A. u. rüppelli* from northeastern Africa (Shoa)."

I quite agree with Phillips that the speculum color is not a dependable character, but the lighter color of the abdomen in *undulata* and darker in *rüppelli* seems to be a fairly stable criterion. I have seen but one South African example (M.C.Z. 11654) and it is very much lighter than the Abyssinian birds. Specimens from Tanganyika, Kenya Colony, and Uganda are intermediate in this respect as they are in range. I feel therefore, that it is possible to recognize two forms of this duck although they are not well defined.

Doctor Phillips erroneously reports the present specimens in his work[62] as coming from the *Amssi Plateau*, undoubdedly intended to be Arussi Plateau.

The characters on which the two races are said to be distinguished (according to Neumann) are as follows:

A. undulata rüppelli.—Speculum of wing blue-green, reflecting according to the light from bluish green to purplish blue or pure purple; underparts of body darker than in *undulata.*

A. undulata undulata.—Speculum green, reflecting from green to blue, but not to purple; underparts of body much lighter, whiter, than in *rüppelli.* Also the scale-like marginations of the body feathers are said to be more distinct in this form than in *rüppelli.*

ANAS CRECCA Linnaeus

Anas crecca Linnaeus, Syst. Nat., ed. 10, p. 126, 1758: Europe; restricted type locality, Sweden.

Specimens collected:

Two adult males, Adis Abeba, Ethiopia, December 31, 1911.

Both specimens are badly stained with rust, making comparison with others difficult. One (U.S.N.M. 243002) has quite a number of dark greenish-blue feathers around and behind the eyes while the other (U.S.N.M. 243003) has very few. The former also has a narrow frontal V of dark feathers along the forehead at the base of the bill, the two horns of the V projecting backwards more than half way to the eyes but failing to form superciliary lines by virtue of their incompleteness.

Specimens from central China (Szechwan) average slightly smaller than European birds but the extremes in both groups are approximately the same.

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[61] Nat. Hist. of the Ducks, vol. 2, p. 115.

[62] Vol. 2, p. 115.

This species is more than subspecifically distinct from the North American green-winged teal and the two should be kept as species, not as races as Hartert has done in the "Vögel der Paläarktischen Fauna."

On March 18, at Lake Abaya, 12 of these ducks were seen by Doctor Mearns.

DENDROCYGNA VIDUATA (Linnaeus)

Anas viduata Linnaeus, Syst. Nat., ed. 12, vol. 1, p. 205, 1766: Cartagena, Colombia.

Specimens collected:

Adult female, Lake Rudolf, Kenya Colony, July 5, 1912.

The specimen listed above has the black throat band interrupted by white in the midventral line, agreeing in this respect with two birds from the White Nile (Fashoda and Lake No) and differing from a pair from Kilosa, Tanganyika Territory, and from one from Ethiopia, in the Museum of Comparative Zoölogy. The completeness of the black band may be a character of age. The crown is much stained with tawny, the cheeks slightly so.

A large number of specimens of both sexes from various localities in Africa and South America presents no variations other than individual or due to wear. The present example is rather large (but not unusually so) having a wing of 230 millimeters; tail of 62 millimeters; and culmen of 46.5 millimeters. The largest of a series of seven males from the Sudan (Lake No, White Nile) has the following measurements: Wing, 231 millimeters; tail, 58 millimeters; culmen, 48 millimeters (measurements in both cases by E. A. Mearns).

This species was not recorded from Turkanaland by Doctor van Someren, in his paper on the birds collected by Captain Gemmel[63] and, as far as I know, this specimen constitutes the first record for that little-known region (using Turkanaland in a very broad sense, including the Rendile country).

On Lake Rudolf about a thousand of these ducks were seen on July 5–8, and a few others were noted several days later.

ALOPOCHEN AEGYPTIACUS (Linnaeus)

Anas aegyptiacus Linnaeus, Syst. Nat., ed. 12, vol. 1, p. 197, 1766: Egypt.

Specimens collected:

Adult male, Alaltu, Ethiopia, January 15, 1912.

Adult female, near Saleish, Ethiopia, January 17, 1912.

Adult male, Tana River at mouth of Thika River, Kenya Colony, August 24, 1912.

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[63] Journ. E. Afr. and Uganda Nat. Hist. Soc., February, 1921, no. 16, pp. 3–38.

Immature, unsexed, Hor, latitude 3° 19′ N., Kenya Colony, June 27, 1912.

In a series of 21 adults, ranging from Ethiopia to the White Nile, eastern Belgian Congo, Kenya Colony, Tanganyika Territory, and South Africa, the only variations appear to be individual or due to the length of time the plumage has been worn. The chief individual variation is in the amount of reddish-brown color on the sides of the head, and on the neck, and in the size of the chestnut patch on the breast. In some the red-brown is interrupted between the eye and the bill; in others it is continuous through the eye to the base of the bill, which, in some instances is bordered all around; in one or two (probably subadult) individuals there is scarcely any chestnut on the head except a spot surrounding the eye; and one or two have scattered chestnut feathers all over the throat. In a general way it seems that the red-brown loreal area is interrupted by white more often and more extensively in adult males than in adult females, but exceptions occur in both sexes.

A young bird (U.S.N.M. 218292), unable to fly by reason of the undeveloped wing quills, is about the size of an adult yellow-billed duck (*Anas undulata*). It was taken at Hor on the northern border of Kenya Colony, June 27. The down feathers have disappeared except those on the tips of the primaries, which are but 25 to 50 millimeters in length. The wing coverts are developed, the lesser being white, the middle and greater cinereous; head all white, washed with pale tawny gray on the crown, with very pale cinnamon buff on the postocular region, and with tawny dusky on the cheeks; upper neck, mantle, rump, and tail feathers, though quite young, are colored very much as in adults but paler; upper tail coverts drab; under parts paler than in adults, with finer vermiculations on the sides and without a chestnut patch on the breast; bill higher and more swollen than in adults.

In adult birds the under tail coverts vary considerably in the intensity of their coloration. In some birds they are dark tawny buff, while in others, regardless of sex, they are much lighter. Granvik[64] writes that one of his specimens has almost white under tail coverts, some with a pale yellow tint.

The measurements of the series of adult birds in the United States National Museum, made by Mearns, are as follows:

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[64] Journ. für Ornith., 1923, Sonderheft, p. 33.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia, Alaltu	♂	405	133. 0	52. 0	76. 0
Kenya Colony, Tana River at mouth of Thika River	♂	400	145. 0	47. 0	79. 5
Kenya Colony:					
Naivasha	♂	389	134. 0	50. 0	80. 0
Do	♂	396	136. 5	50. 0	79. 0
Do	♂	391	132. 0	44. 5	76. 0
Do	♀	330	141. 0	47. 0	70. 5
Do	♀	395	139. 0	50. 0	83. 0
Do	♀	380	130. 5	48. 0	75. 0
Do	♀	364	132. 0	45. 0	69. 0
Do	♀	360	128. 0	45. 0	68. 5
Do	♀	410	134. 0	50. 0	81. 0
Southern Guaso Nyiro River, Sotik district	♀	395	128. 0	46. 0	69. 0
Lime Springs, Sotik district	♀	270	135. 0	52. 0	75. 0
Ethiopia, near Saleish	♀	395	153. 5	44. 0	67. 0

Mearns' observational records of this species are as follows:

Ethiopia: Loco and Gidabo River, March 15–17, 2 seen; Black Abaya Lake, March 18–19, 52; Galana River, March 20, 4; Gato River (4,000 feet), near Gardula, March 29 to May 17, 100; Anole and Wobok, June 18–19, 7; Chaffa and Ballal River, June 24–25, 2; Kenya Colony: Hor, June 26–30, 6; Lake Rudolf, July 5–8, 1,000; 50 miles southeast of Lake Rudolf, July 10, 50; Guaso Nyiro River, August 31, 10; near mouth of Thika River, August 23, 10; junction of Tana and Thika River, August 23–26, 100; Ithanga Hills, August 28, 2.

PLECTROPTERUS GAMBENSIS GAMBENSIS (Linnaeus)

Anas gambensis LINNAEUS, Syst. Nat., ed. 12, vol. 1, p. 195, 1766: Gambia.

Mearns recorded seeing a spur-winged goose on the Northern Guaso Nyiro River, July 31–August 3. It was not collected.

CYANOCHEN CYANOPTERUS (Rüppell)

Berniela cyanoptera RÜPPELL, Syst. Uebers., p. 129, pl. 47, 1845: Shoa.

Specimens collected:

Two male adults, Alaltu, Ethiopia, January 16, 1912.

One female adult, Alaltu, Ethiopia, January 16, 1912.

The blue-winged goose is an uncommon bird in collections and, from all accounts, is very local in its entire range and never goes about in flocks, being found chiefly in isolated pairs.

Recently Blaauw[65] kept some individuals in captivity and found them to be largely nocturnal, a factor which also helps to explain their apparent scarcity.

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[65] Avicultural Mag., vol. 3, ser. 4, no. 7, July, 1925, pp. 169–171.

Besides the three birds collected by Mearns (listed above) only one other specimen has been available for comparison—an adult female (M.C.Z. 98370) from the Arussi highlands of Ethiopia, collected by Erlanger. The measurements of the four specimens are as follows:

Locality	Sex	Wing	Tail	Culmen
Ethiopia:				
Alaltu	♂ adult	375	135. 5	32
Do	do	386	140	34. 5
Do	♀ adult	338	121	31
Arussi	do	321	119	33

The females are darker below than the males and have the chin less pure white than the latter.

According to Neumann[66] this goose is not known from south of the Hawash Valley. It is a bird of the highlands, occurring at altitudes of from 8,000 to 10,500 feet (2,400 to 3,200 meters). Erlanger[67] found it very common at Adis Abeba and in the Djamdjam highlands.

Order FALCONIFORMES

Family SAGITTARIIDAE

SAGITTARIUS SERPENTARIUS (Miller)

Falco serpentarius J. F. MILLER, Icon. Anim., pl. 28, 1779: Cape of Good Hope.

No specimens of the secretary bird were collected by the Frick expedition, but in his field diary Mearns noted seeing 1 on the Thika River, August 27; 2 on the Athi River, August 31, and 4 at the latter locality on September 1.

Not having any material from northeastern Africa or from Senegal, I can not deal with the so-called races, *orientalis* and *gambiensis*, and follow Sclater[68] in considering them identical with *serpentarius*.

Family ACCIPITRIDAE

PSEUDOGYPS AFRICANUS (Salvadori)

Gyps africanus SALVADORI, Not. Stor. R. Acad. Torino, 1865, p. 133: Sennar.

Specimens collected:

One immature unsexed, Adis Abeba, Ethiopia, January 11, 1912.
Female, Bodessa, Ethiopia, May 28, 1912.
Female (foot only), Bodessa, Ethiopia, May 28, 1912.

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[66] Journ. f. Ornith., 1904, p. 329.

[67] Idem, 1905, pp. 54–55.

[68] Syst. Avium Ethiop., 1924, p. 46.

Erlanger[69] described three new races of this vulture, thereby making four in all. Of more recent writers, the only ones who recognize any of these three are Swann[70] and Bannerman.[71] Other workers either reject them outright or withhold recognition because of lack of material. The material which I have had the opportunity of examining is not particularly extensive but is suggestive in that it indicates in no uncertain terms that all the so-called races of this vulture may be accounted for by plumage variations within the geographical range of the typical form. Not only do some individuals agree with one form and others from the same place with different ones, but some individuals have the upper parts of one race and the underparts of another. Thus, for instance, an adult male from Ulukenia Hills, Kenya Colony (U.S.N.M. 214789) has the upper parts like Erlanger's figure[72] of *fülleborni* and the underparts like those of *zechi* (fig. 4). Another from Rhino Camp, West Nile, Uganda (U.S.N.M. 216278) resembles *schillingsi* above and *africanus* below.

In this connection it is interesting to note that Gyldenstolpe[73] records a specimen from the eastern Congo (not very far from Rhino Camp) which, "* * * seems to agree best with the description of *fülleborni*." The race *schillingsi* is said to be grayer than typical *africanus; fülleborni* is paler than *schillingsi;* and *zechi* is still paler than *fülleborni.* However, any individual may go through all these plumages in turn, becoming grayer and paler with succeeding years. Granvik[74] seems to have reversed the sequence of plumages and makes out the pale plumage to be immature and the dark type adult. On the other hand, it may possibly be that while eastern specimens may occasionally achieve the paleness said to be characteristic of *zechi*, the latter may be definitely and consistently lighter and be worthy of nomenclatural distinction. The forms *schillingsi* and *fülleborni* seem not at all different from *africanus.*

Granvik[75] in commenting on Erlanger's races, writes as follows: "Without the least hesitation I might well refer my specimens to the forms described by him. * * * My three birds are, however, all shot by the nests and thus stationary in one and the same small area."

Age, season, and wear seem to account for all differences in plumage, and these vultures are a group notorious for the amount of individual variation they exhibit. It therefore seems best not to attempt to " split " the species into races.

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[69] Journ. f. Ornith., 1904, pp. 148–152.

[70] Synopsis of Accipitres, ed. 2, 1922, pp. 8–9.

[71] Ibis, 1923, p. 743; 1924, p. 212.

[72] Journ. f. Ornith., 1904, pl. 3, fig. 3.

[73] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 289.

[74] Journ. f. Ornith., 1923, Sonderheft, p. 63.

[75] Idem, 1923, Sonderheft, p. 63.

Recently W. P. Lowe[76] has put on record some field observations of the plumage variations and changes of this and other vultures. He writes in conclusion that it may be stated definitely that *schillingsi*, *fülleborni*, and *zechi* are synonymous, "* * * merely based on age and sex, of one species, *Pseudogyps africanus*." According to this writer, the first plumage is dark brownish, the head and neck well covered with brownish down; the neck pale bluish-gray with some yellow spots. "* * * After probably four or five years, still dark brown. Down of neck greatly diminished, head and neck black. Breeds in this plumage." The next stage is similar to the last, but the back is white, spotted with brown. Finally, "* * * adult males very dark, almost black, including crop-patch. Adult females very pale dirty drab. Very old birds, whitish. Crop-patch brown. Ruff pure white in both sexes."

Mearns took the following measurements of seven birds in the field.

Sex	Weight in pounds avoirdupois	Length in inches	Alar expanse (inches)	Wing measured straight (inches)	Tail (inches)	Culmen chord from cere (inches)	Depth of bill (inches)	Tarsus (inches)	Middle toe to end of digits (inches)
♂ immature	11. 50	35. 00	88. 00	23. 40	10. 50	1. 80	1. 30	4. 00	4. 10
Do	12. 00	34. 50	87. 50	23. 75	10. 40	1. 80	1. 30	3. 75	4. 30
Do	11. 25	34. 80	85. 50	23. 75	10. 60	1. 85	1. 30	3. 65	4. 00
♂ adult	12. 00	35. 50	87. 00	23. 50	10. 50	1. 90	1. 45	3. 90	4. 40
♀ adult	11. 50	35. 00	85. 00	22. 50	11. 00	1. 90	1. 30	3. 65	4. 15
♀ immature	13. 00	35. 75	84. 00	22. 75	11. 25	1. 75	1. 25	3. 35	4. 20
♀ adult	13. 40	34. 50	87. 00	23. 50	10. 00	1. 80	1. 20	3. 40	4. 25

He wrote at the time that—

> * * * from the resemblance in size and form I am satisfied that these seven are conspecific. The neck is long and slender, the skull narrow, nostril vertical, or parallel to side of base of culmen. Skin of head and neck is slaty black, like the bill and cere; head apparently covered with fine hairs, thickest on top of the head, dirty white in color; neck more or less covered with tufts of whitish down, quite heavy on the nape; chest patch furry, sooty brown. Feet and claws slaty black. Iris, in all seven, very dark brown. The adults have white rumps and backs, two of them have this white faintly tinged with clay color, perhaps dirty. The immature birds represent a different plumage, dark below, under wing-coverts dark, rump and back dark, neck ruff darker, with feathers narrower and centrally streaked with whitish like the sides and underparts. I suppose the white-backed birds to be adult, the dark-backed, immature. Using " adult " to indicate white-backed, and " immature " to indicate dark-backed birds, I will describe the plumage of the seven fresh birds. All have the soft parts colored alike, except that the long, nearly naked necks

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[76] Ibis, 1929, pp. 439–442.

of adults are practically all slaty black while the young, from head to ruff, are mixed with large areas of greenish flesh color; in one specimen the slaty black only appearing as occasional spots (somewhat tinged with reddish) on the lower neck. In the oldest specimen, an adult female (skin preserved) the upper side of the wing, the primaries, secondaries, and longest tertials are grayish black, as are the bastard wing and outermost greater wing converts; rest of upper side of wing and upper back cinereous, the feathers bordered with pale buff. Back and rump white, as is the long, furry down covering the skin between the feather tracts; tail grayish black above and below. Thighs externally cinereous buff or clay color, internally coated with pure white down; crop patch dark brown. An inconspicuous neck ruff, above only, is whitish drab, not much paler than the upper back. Underside of body pale drab, the feathers having slight indications of a whitish shaft streak; under wing-coverts white, the greater ones broadly tipped or subterminally barred with grayish black; under tail-coverts brownish black. An adult male and an adult female differ only in having the under surface of the body less uniform pale drab, the feathers showing distinct traces of writish shaft streaks; rump slightly tinged with clay color. These birds are probably not quite so fully adult as the female described above. Adults when on the wing show the white backs very clearly, or the white under wing-coverts, according to position in the air. Immature birds, of course, appear all dark. The four immature specimens differ from adults in lacking the white back and rump and the white under wing coverts. The upper wing-coverts are dark brown, more or less bordered with drab. The under wing-coverts, outer aspect of thighs, back, and rump are dark brown with broad, dirty white streaks.

Swann[77] writes the wing length of the adult is 557 millimeters. However, an immature bird from Adis Abeba has a wing 674 millimeters in length, and Erlanger, Granvik, and others have recorded birds with this dimension amounting to 600 and 640 millimeters. It may be that Swann's figure is due to a typographical error and should read 657.

The acrotarsium is usually covered with small hexagonal or circular scales, but occasionally adjacent scales fuse, forming elongate, oblong, somewhat transverse, scutes, suggesting the frontal scutes of some hawks such as *Haliaeetus*, *Buteo*, etc. Only a single specimen (U.S.N.M. No. 243537) of the series examined shows any of these fused scales, but it has three of them.

This vulture is abundant and widely distributed throughout the region covered by the Frick expedition. The following observations are taken from Mearns' diary: Aletta, March 7–13, 30 birds; Loco, March 13–15, 30 seen; Gidabo River, March 15–17, 4; the Abaya Lakes, March 18–26, 66 noted; near Gardula, March 26–29, 4 birds. Strangely enough, although Mearns spent a long time (March 29 to May 17) on the Gato River near Gardula, he did not record this bird there a single time. Dokato village and Kormali, May 18, 100 seen; Bodessa and Sagon River, May 19 to June 6, 78 birds; Tertale, June 7–12, 29 noted; El Ade, June 12, 25 seen; Mar Mora, June

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[77] Synopsis of the Accipitres, ed. 2, 1922, p. 8.

13–14, 20 birds recorded; Turturo, June 15–17, 40 seen; Anole, June 17, 20 seen; Wobok, June 18, 50 birds; near Saru, June 19, 20 birds; Yebo, June 20, 20 seen; Karsa Barecha, June 21, 50 noted; Malata, June 22, 50 birds; Chaffa villages, June 23–25, 100 birds observed; Hor, June 26–30, 25 seen; dry river south of Hor, July 1–2, 25 seen; Dussia, July 3–4, 25; Lake Rudolf and country to the southeast for 25 miles, July 5–12, 370 individuals noted; Indunumara Mountains, July 13–18, 350 seen; plains at base and south of Endoto Mountains, July 19–24, 200 birds; Er-re-re, July 25, 100; Le-se-dun, 26 July, 100; Malele and country to the south for 45 miles, July 27–30, 160; Northern Guaso Nyiro River, July 31 to August 3, 80 seen; Lekiundu River, August 4–8, 40 birds; Meru and Kilindini (Equator), August 9–10, 14 seen; Tharaka District, August 12, 4 noted; Tana River, August 20–26, 30 seen; Thika River, August 26–27, 20 birds; west of Ithanga Hills, August 28, 10 seen; Athi River, August 29 to September 1, 55 birds; Escarpment, September 4, 1 bird seen.

At Bodessa, Mearns made the following entry in his notes about this bird:

> Comes in flocks whenever a mule dies or a bullock is slain for food for the Hawash men, but does not remain about waiting for small bits of food like the smaller vultures. It can tear open the tough skin of a mule quite easily without waiting for it to decay and burst open. In this it is assisted by the Emin Hawk-Eagle (*Aquila rapax raptor*); but the two species of small vultures stay away until the others have fed and content themselves with the leavings and small bits picked up about the camp. Within an hour of the death of a mule or the butchering of a bullock the white-backed vultures come and assemble in a big flock; when full of meat they sit in flocks on the larger trees near by, but they soon clean the carcase of a mule, and then disappear.

He found this species common at Adis Abeba, December 26 to January 7, and similarly numerous along the Hawash River, January 26 to February 13.

TORGOS TRACHELIOTUS NUBICUS (H. Smith)

Vultur nubicus H. SMITH, in Griffith's An. King., vol. 1, p. 164, 1829: Nubia.

Specimens collected:

Male, Arussi Plateau, Ethiopia, February 20, 1912.

The northern form of this vulture lacks the ear lappets which are present in birds from further south.

The specimen collected is fully adult, but quite small. It has a wing length of only 748, a tail of 401, and a culmen (from the cere) of 68 millimeters. Swann[78] gives the wing measurements for the species (both sexes) as 747–785 millimeters. A subadult male (with whitish down on the head) from Rhino Camp, West Nile, is slightly larger than the present specimen, having the following measurements:

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[78] Synopsis of Accipitres, ed. 2, 1921, p. 10.

Wing 761, tail 428, and culmen 71.5 millimeters, as may be seen from the following table.

Locality	Sex	Wing	Tail	Culmen
Ethiopia	♂ adult	714	367	68. 0
Uganda, Rhino Camp	do	728	394	71. 5
Kenya Colony:				
Potha, Kapiti Plains	do	735	389	65. 0
Ulukenia Hills	do	741	395	66. 5
North Guaso Nyiro, Lekiundu River	do	737	381	67. 0
Do	♀ adult	711	384	58. 0
Uganda, Tombeki River (below Assua River)	do	735	371	70. 0

Sclater[79] gives the range of this vulture as "Egypt to Kordofan, Abyssinia and Somaliland" and that of the typical southern form as "Africa south of the Zambesi," leaving a wide gap between the two races. Erlanger[80] wrote that as far as he knew but one specimen from East Africa (collected by C. G. Schillings) existed in European museums at the time of his writing. Zedlitz,[81] like Erlanger, did not recognize *nubicus* because of lack of material. Just how far south *nubicus* ranges is not known, but it certainly occurs south of Ethiopia and Somaliland. Sclater and Praed[82] indicate that there are no East African specimens in the British Museum. It therefore seems that the bird is scarce in tropical East Africa, and it is consequently worth noting that the United States National Museum possesses specimens from Kenya Colony (Ulukenia Hills, Kapiti Plains, and Lekiundu River) that belong to this race.

TRIGONOCEPS OCCIPITALIS (Burchell)

Vultur occipitalis BURCHELL, Travels, vol. 2, p. 329, 1824: Makkwari or Matlowing River, near Kuruman.

Specimens collected:

One unsexed, Arussi Plateau, 9,200 feet altitude, Ethiopia; February 25, 1912.

One female, Arussi Plateau, 9,200 feet altitude, Ethiopa; February 20, 1912.

One male (foot only), Galana River, Lake Abaya, Ethiopia; March 19, 1912.

One female, Gato River, near Gardula, 4,000 feet, Ethiopia; April 24, 1912.

One female (foot only), Bodessa, Ethiopia; May 28, 1912.

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[79] Syst. Avium Ethiop., 1924, p. 48.

[80] Journ. f. Ornith., 1904, p. 137.

[81] Idem, 1910, pp. 362–363.

[82] Ibis, 1919, p. 706.

The material examined (10 specimens) supports Erlanger's statements[83] as to the sequence of plumages in this vulture fairly well. Young birds may be told by the fact that they have the top and back of the head covered with brown, dense, downy feathers, and the entire bird likewise is brown. Very old birds have the feathers of the top and back of the head white and have the middle upper wing coverts edged with white and greater underwing coverts white. Birds of intermediate age have the white on the crown and nape tinged with light tawny and have the middle upper wing coverts edged with grayish, and the greater underwing coverts brown like the middle and lesser rows.

The bird from the Arussi Plateau is peculiar in that it has the feathers of the crown and nape partly brownish, as in subadult birds, but has the white greater under wing coverts as in adult specimens. The bird is in very worn plumage. The other specimens collected are adult birds. Of the two represented by one foot each, the Bodessa bird is less adult than the Galana River specimen as it has a few dusky feathers among the white ones on the tibia, while the other has only pure white ones.

Swann[84] gives the wing length of the white-headed vulture as 582 millimeters. This is rather too high for an average and yet not high enough for a maximum. Seven full-grown birds (both sexes) have wings varying length from 547 to 590 millimeters. Females are slightly larger than males.

The white-headed vulture occurs in the open country of Africa from Portuguese Guinea, the upper Guinea savannah region, east through the Sudan to Sennar and Ethiopia, south to the Orange River. Being a denizen of plains country, it is naturally absent in the Congo forest area.

Mearns first met with this vulture at Dire Daoua, where he found it—

> * * * less numerous than either of the others (that is, *Necrosyrtes monachus pileatus* and *Neophron percnopterus percnopterus*). Occassionally seen in small companies on the road from Dire Daoua up as far as Gada Bourca. At one spot as many as 25 were feasting on a dead camel by the roadside. Some were so full of meat that it was scarcely possible for them to rise from the ground.

This bird was often seen along the Hawash River, January 26 to February 13. Other records are as follows: Gato River, March 29 to May 17, 100 seen; Bodessa and Sagon River, May 19 to June 3, 3 seen; Tertale, June 7–12, 6 birds; El Ade, June 12–14, 6 birds; Mar Mora, June 14, 4 seen; Turturo, June 15–17, 16 birds; Anole, June 17, 12 seen; Wobok, June 18, 50 noted; near Saru, June 19,

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[83] Journ. f. Ornith., 1904, pp. 138–139.

[84] Synopsis of the Accipitres, ed. 2, 1922, p. 10.

30 birds; Yebo, June 20, 20 seen; Karsa Barecha, June 21, 30; Malata, June 22, 30 seen; Chaffa villages, June 23–25, 14 birds; Lake Rudolf and country to the southeast, July 5–12, 70 birds observed; Indunumara Mountains, 47 seen; plains at base and south of Endoto Mountains, 45; Er-re-re, July 25, 20 birds; Le-se-dun, July 26, 20 seen; Malele and region to the south for about 30 miles, July 27–29, 16 seen; Northern Guaso Nyiro River, July 31 to August 3, 14 birds; Lekiundu River, August 4–8, 14 seen.

While at Bodessa, Mearns wrote that—

> * * * this is much the finest of the vultures. I have never seen a flock of them together. They often visit the camps singly, or in pairs, often selecting a different tree from the other species; but the two smaller species (*Neophron* and *Necrosyrtes*) often insist upon keeping their company; and in shooting them I have once killed a *Neophron* and once a *Necrosyrtes* at the same shot. They usually visit camp once or twice daily to see what's doing, but do not sit around all day like the *Necrosyrtes*.

NEOPHRON PERCNOPTERUS PERCNOPTERUS (Linnaeus)

Vultur percnopterus LINNAEUS, Syst. Nat., ed. 10, p. 87, 1758: Egypt.

Specimens collected:

Female adult, Dire Daoua, Ethiopia, November 28, 1911.
One young unsexed, Dire Daoua, Ethiopia, December 2, 1911.
One female adult, Dire Daoua, Ethiopia, December 3, 1911.
One female immature, Dire Daoua, Ethiopia, December 8, 1911.
One male adult (foot only), Dire Daoua, Ethiopia, February 20, 1912.

The acquisition of the white adult plumage is a very gradual process in the Egyptian vulture. Erlanger[85] has worked out the sequence of plumages in detail and to his account I can add only a few intermediate steps. The change as he gives it is as follows: The plumage of the young bird is brown; the light plumage of the adult first appears on the rump, back, and upper wing coverts; then, in somewhat older birds, on the entire underparts and the nape; the next stage being one in which the entire bird is almost uniform dirty gray. Then, at the next molt the white feathers of the adult plumage appear, replacing the dirty gray ones. The specimens in the United States National Museum indicate that in the transition from the brown immature plumage to the grayish subadult stage, the light grayish feathers appear first on the rump while the back and upper wing coverts are still covered with the brown feathers of immaturity. From the rump the molt spreads to the back, and the upper wing coverts do not begin to molt until the replacement of the feathers of the back is well advanced. The molt of the upper wing coverts is more or less irregular but seems to begin with the lesser coverts and to progress from them to the greater ones.

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[85] Journ. f. Ornith., 1904, p. 153.

Judging by rather scanty and not entirely satisfactory evidence, it seems as though the remiges are not molted in the transition from immature to subadult plumage, which, if true, would indicate that it takes but one year to make this change and two to achieve the full adult plumage.

The molt from the grayish or tawny grayish subadult plumage into the adult type is irregular, apparently beginning more or less simultaneously all over the body, but not involving the remiges or the rectrices until the body molt is well advanced.

Swann[86] gives the wing length of this vulture as varying from 475 to 520 millimeters. The series (adults only) in the United States National Museum have wings of from 484 to 537 millimeters. Erlanger's figures for birds from Ethiopia and Somaliland[87] average slightly higher than do the birds collected by Mearns in the same general region.

While females average slightly larger than males, the amount of individual variation in both sexes is so great that the size limits are about the same for the males as for the females.

Locality	Sex	Wing	Tail	Culmen
Syria, Beyrout	♂	507	260	
Egypt, Helouan	♂ (?) immature.	475	258	29. 5
Do	♀	515	284	33. 0
Sudan, El Dueim, White Nile	♂	498	274	29. 5
Do	♂	524	303	32. 5
Do	♂	499	271	28. 5
Do	♀	498	291	27. 5
Do	♀	484	277	29. 5
Do	♀	496	274	32. 0
Ethiopia, Dire Daoua	♀	500	267	32. 0
Do	♀	528	280	32. 0
Do	Juvenile	502	265	30. 0
Do	♀ immature	464	245	29. 0
Sardinia	♀ juvenile	488	294	33. 5
Do	Immature	496	280	30. 0
Spain, Province of Burgos		537	288	33. 5

This vulture, commonly known as "Pharaoh's chicken," is very abundant and widely distributed throughout Ethiopia and Kenya Colony. Mearns found it common at Djibouti on the Red Sea, and abundant around native villages from there up to Adis Abeba. "Indeed we were seldom out of sight of them on the march from Dire Daoua up to here (Adis Abeba). They associated with the other vultures, small and large, and with the crows and pariah dogs when feeding on dead camels and other animals." At Adis Abeba, December 26 to January 7, it was commonly seen, and along the Hawash River, January 26 to February 13, many were noted. Other records are Aletta, March 7–15, 10 seen; Loco, March 13–15, 10 seen; Gidabo River, March 15–17, 10 birds; Abaya Lakes, March 18–26, 26 noted; near Gardula, March 26–29, 2 seen; Bodessa and Sagon River, May 18 to June 3, 8 noted; Tertale, June 7–12, 2 seen; Turturo, June 15–17, 1 bird; Anole, June 17, 1; Wobok, June 18, 2; Karsa Barecha, June 21, 2 seen; Malata, June 22, 4 birds; Chaffa villages, June 23–25, 6 noted; Lake Rudolf and adjacent country to the southeast, July 5–12, 70; Indunumara Mountains, July 13–18, 39 birds; plains at base and south of Endote Mountains, July 19–24, 22 seen; Er-re-re, June 25, 30 birds; Le-se-dun, July 26, 30 seen; Malele and country south for 45 miles, July 27–30, 44 birds noted; Northern Guaso Nyiro River, July 31 to August 3, 60 seen; Lekiundu River, August 4–8, 10 birds; west of Ithanga Hills, August 28, 1 seen.

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[86] Synopsis of the Accipitres, ed. 2, 1922, p. 11.

[87] Journ. f. Ornith., 1904, p. 153.

NECROSYRTES MONACHUS PILEATUS (Burchell)

Vultur pileatus BURCHELL, Travels, vol. 2, p. 195, 1824: Country south of Orange River, that is, Hopetown District of Cape Province.

Specimens collected:
Male, Dire Daoua, Ethiopia, December 1, 1911.
Three unsexed, Dire Daoua, Ethiopia, December 2, 1911.
Male adult, Dire Daoua, Ethiopia, December 8, 1911.
Female, Dire Daoua, Ethiopia, December 10, 1911.
One unsexed, Dire Daoua, Ethiopia, December 16, 1911.
Male (foot only), Malke, Ethiopia, March 3, 1912.
Male (foot only), Bodessa, Ethiopia, May 28, 1912.

Swann[88] gives the wing measurements of adults of the two races of this vulture as follows: *monachus*, 467 millimeters; *pileatus*, 480–510 millimeters.

The present series of *pileatus* indicates much wider range of variation than these figures show. The following specimens have a wing range (in full-grown birds) of from 458 to 530 millimeters. No specimens of typical *monachus* have been available for comparison.

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[88] Synopsis of the Accipitres, ed. 2, 1922, pp. 11–12.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Tanganyika Territory, Morogoro.	♂	498	238	31	80
Kenya Colony:					
Ithanga Hills	♂	500	264	------	80
Southern Guaso Nyiro River.	♂	520	267	32. 5	81
Sudan; Lake No, White Nile	♂	458	228. 5	29	77
Ethiopia:					
Dire Daoua	♂	490	240	29. 5	78
Do	♂	505	250	33	75
Malke	♂	------	------	------	76
Bodessa	♂	------	------	------	82
Dire Daoua	♀	523	245	32. 5	80
Kenya Colony, Guaso Nyiro	♀	515	252	33	81
Tanganyika Territory, Morogoro.	♀	521	241	30. 5	74
Ethiopia, Dire Daoua		513	256	29	71
Do		513	250	28. 5	76
Do		485	250	28	75
Do	Juvenile	530	261	30	75
Do	do	511	242	30. 5	73. 5
Kenya Colony, Southern Guaso Nyiro River.	♀	548	231	33. 0	78

The plumages of this vulture are rather complicated and there is still much to be learned of their sequence and change. A nestling bird in the Museum of Comparative Zoölogy, from Fashoda, White Nile, is entirely covered with thick white down, except on the loreal areas which are bare. The remiges and their upper coverts, the scapulars, a few feathers of the spinal pteryla, and the rectrices of the juvenal plumage are just sprouting and are dull earth brown in color. The bill is very high and short, the culmen deeply decurved, and the nostrils more circular than in adults. No specimens in complete juvenal plumage have been seen, the next stage being represented by birds full grown in size but with the top of the head feathered. These birds differ from adults in that the occiput, crown, and center of the forehead are covered with short, dark fuscous-black feathers, the chin and upper throat are liberally though thinly dotted with short, somewhat shaftless feathers of the same color as the crown; the blackish feathering of the top of the head encircles the ear, and continues down the sides of the neck to the lower part of the throat which is completely clothed with blackish feathers. There is no whitish crop or breast patch in these birds but the blackish of the lower throat merges into the fuscous brown of the underparts of the body.

The next stage is represented by a specimen in the United States National Museum (U.S.N.M. 223196) which resembles the preceding plumage but has the chin and upper throat bare and has the white downy patch on the breast.

The adult birds have the entire head, back to the nape bare, the chin and upper half of the throat are likewise bare; the lower portion of the throat retains a small midventral patch of blackish feathers which are isolated from the dark underparts of the body by a grayish white breast patch surrounded by whitish down. There is no black line down the sides of the neck and the feathers of the hind neck seem to get lighter with successive molts, or, in other words, with age. The whitish down on the breast develops before the grayish-white area adjacent to it; one specimen before me has the breast and lower throat dark brown like the abdomen but has the whitish pectoral downy patches well developed.

Reichenow[89] does not consider *pileatus* distinct from the typical *monachus*, and several more recent investigators[90] have followed his example. However, Swann in his "Synopsis of the Accipitres"[91] finds the two races to be recognizable, and so do Roberts and Sclater. It seems from all published measurements that the latter group of writers are correct as the western birds (typical *monachus*) have longer, more slender bills, and shorter wings than do eastern and southern examples (*pileatus*).

The present form occurs from French Somaliland, Eritrea, Ethiopia, and the Anglo-Egyptian Sudan south through eastern Africa to the Cape Province. Mearns observed it at many localities during the course of the Frick expedition. He first noted it from the railroad coming up from Djibouti. "As soon as the first plateau was reached this species appeared and continued to be the most abundant vulture up to Adis Abeba (8,000 feet or 2,400 meters)." At Adis Abeba, December 26 to January 7, it was common; likewise along the Hawash River, January 26 to February 13. At Aletta, March 7–13, 50 were seen; Loco, March 13–15, 20; Gidabo River, March 15–17, 20 birds; the Abaya Lakes, March 18–26, 725 birds recorded; near Gardula, March 26–29, 50; Gato River, March 29 to May 17, 1,000; Bodessa and Sagon River, May 18 to June 6, 350; Tertale, June 7–12, 600; El Ade, June 12–14, 150; Mar Mora, June 14, 100; Turturo, June 15–17, 200; Anole, June 17, 50; Wobok, June 18, 200; near Saru, June 19, 200 birds; Yebo, June 20, 200; Karsa Barecha, June 21, 100; Malata, June 22, 50; Chaffa villages, June 23–25, 50; Hor, June 26–30, 200 birds; Lake Rudolf and adjacent country to the southeast, July 5–11, 350; Indunumara Mountains, July 14–18, 4 birds; plains at base and south of Endoto Mountains, July 19–24, 110 seen; Er-re-re, July 25, 100; Le-se-dun, July 26, 100; Malele and country to the south for 45 miles, July 27–30, 280 birds recorded; Northern Guaso Nyiro River, July 31 to August 3, 800; Lekiundu River, August 4–8, 200; Meru and Kilindini, August 9–10, 20 seen; Tharaka district, August 12, 10 birds; Thika River, August 26–27, 100 seen; west of Ithanga Hills, August 28, 50; Athi River, August 29 to September 1, 109 birds noted.

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[89] Vögel Afrikas, vol. 1, 1901, p. 522.

[90] Lönnberg, Kungl. Sv. Vet. Akad. Handlgr., 1911, p. 55; Zedlitz Journ. f. Ornith., 1910, p. 365; C. H. B. Grant, Ibis, 1915, p. 238; Van Someren, Nov. Zool., vol. 29, 1922, p. 38; and Granvik, Journ. f. Ornith., 1923, Sonderheft, p. 65.

[91] 2d ed., 1922, pp. 11–12.

At Bodessa, Mearns wrote of this bird:

> * * * In usual abundance and constant in attendance, perching in flocks in large dead trees, or singly or in small numbers on smaller, green trees. Often they remain on the ground, or, occasionally, one is found taking a siesta in the dense foliage of trees in the canyons. I shot one at the same time I killed a *Pseudogyps* on the carcass of a mule.

MILVUS MIGRANS PARASITUS (Daudin)

Falco parasitus Daudin, Traité d'Orn., vol. 2, p. 150, 1800: South Africa.

Specimens collected:

Female adult, Dire Daoua, Ethiopia, November 27, 1911.

Six male adults, 1 female adult, Dire Daoua, Ethiopia, December 6–29, 1911.

Female adult, Adis Abeba, Ethiopia, January 9, 1912.

Female adult, Gidabo River, Ethiopia, March 16, 1912.

Of the 10 birds collected, 8 are typical examples of *parasitus*, and 2 are somewhat intermediate between *parasitus* and *aegyptius*. These two are both females; one (U.S.N.M. 243633) is from Dire Daoua, and the other (U.S.N.M. 243641) comes from Gidabo River. The former is more reddish below than the latter, but both have the head lighter and more reddish in color than any of the other eight. In this connection it should be noted that Sclater and Praed [92] record five kites in very worn plumage from Erkowit, Anglo-Egyptian Sudan, which, "* * * appear to be an intermediate race between *M. m. aegyptius* and *M. m. parasitus*, as is suggested by Hartert." [93] However, the Erkowit birds have small wings (average 405 millimeters) while the present two have wings 445 and 454 millimeters, respectively, being practically as large as *aegyptius*.

Mearns recorded the measurements of the specimens he collected as follows:

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[92] Ibis, 1919, p. 691.

[93] Vög. pal. Faun., p. 1172.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Dire Daoua	♂	420	251	24. 0	47. 5
Do	♂	425	265	24. 0	47. 0
Do	♂	409	259	23. 5	45. 0
Do	♂	420	260	24. 0	45. 5
Do	♂	422	255	23. 5	46. 0
Do	♂	426	248	24. 5	45. 0
Do	♀	445	290	24. 0	44. 0
Do	♀	412	266	22. 0	45. 0
Adis Abeba	♀	444	281	25. 5	46. 0
Gidabò River	♀	454	297	25. 0	47. 0

All the males are year-old birds at the most, as all have blackish-slatey bills. The small female from Dire Daoua is likewise non-adult.

Swann [94] described a small race *arabicus* from southern Arabia, and Somaliland, of which I have seen four from the former locality (Aden Protectorate). It seems quite recognizable, notwithstanding the fact that Sclater [95] does not grant it subspecific standing.

The typical form *M. migrans migrans* is included in the "List of the birds of the Anglo-Egyptian Sudan" by Sclater and Praed [96] on the strength of an example in the British Museum from Kenya Colony. If specimens from south of the Sudan be of any value in establishing the bird on the Sudan list, it may be well to point out that typical *migrans* has been recorded (three specimens taken) by Loveridge from Sagayo, Tanganyika Territory. On the other hand, Granvik,[97] records *M. migrans aegyptius* from Mount Elgon showing how erratic the wanderings of these kites may sometimes be, and consequently how unsafe it is to establish the occurrence of a species except by actual specimens.

Swann [98] characterizes *parasitus* as "* * * less rufous, more cinnamon brown below with indistinct black shaft lines * * *." A breeding female from Natal, South Africa (H. Friedmann collection) is by far the most richly rufous bird in a series of 69 specimens of *Milvus migrans*, and has the black shaft streaks very distinct.

Immature birds generally have the feathers of the breast light tawny or chestnut tawny medially (with a black calamus), the tawny lightening distally forming an apical whitish area on each feather. In the feathers of the abdomen this lighter color is absent along the length of the feathers, but a small whitish terminal spot is present. One bird in the Museum of Comparative Zoölogy (M.C.Z. 133161, an immature male from Morogoro, Tanganyika Territory) is unusual in its plumage in that all the feathers of the breast and abdomen are pure white with broad, dull earth-brown margins. The thighs and under tail coverts are pale sandy earth brown. Above, this bird is somewhat grayer, less brownish than other immature specimens.

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[94] Synopsis of Accipitres, ed. 2, 1922, p. 153.
[95] Syst. Avium Ethiop., 1924, p. 58.
[96] Ibis, 1919, p. 690.
[97] Journ. für Ornith., Sonderheft, 1923, p. 69.
[98] Synopsis of Accipitres, ed. 2, 1922, p. 154.

Madagascan birds (12 specimens examined) are like examples from continental Africa.

The African kite was observed in large numbers throughout the course of the expedition. Mearns recorded it as very abundant from the Red Sea up to Adis Abeba. At the latter place, on December 26 he observed a pair building a nest. On his journey along the Hawash River, January 26 to February 12, this species was always in sight everywhere he went. More explicit records are: Aletta, March 7–13, 100 birds; Loco, March 13–15, 100 seen; Gidabo River, March 15–17, 100; the Abaya Lakes, March 18–26, 1,000 seen; near Gardula, March 26–29, 80 birds; Gato River, March 29 to May 17, 1,000; Sagon River and Bodessa, May 17 to June 6, 260 birds seen; Tertale, June 7–12, 150; El Ade, June 12–14, 65; Mar Mora, June 14, 40 birds; Turturo, June 15–17, 90; Anole, June 17, 50; Wobok, June 18, 40 seen; near Saru, June 19, 20 seen; Yebo, June 20, 20 birds; Karsa Barecha, June 21, 20; Malata, June 22, 10 noted; the Chaffa villages, June 23–24, 6 birds; Lake Rudolf, July 5–9, 55 seen; Indunumara Mountains, July 14–18, 4; Endoto Mountains, July 21–24, 4; Northern Guaso Nyiro River, July 31 to August 3, 40 birds; Lekiundu River, August 4–8, 60; Meru and Kilindini, August 9–10, 29 seen; Tharaka district, August 11–13, 30 birds; Tana and Thika Rivers, August 23–27, 50 birds observed.

ELANUS COERULEUS COERULEUS (Desfontaines)

Falco coeruleus Desfontaines, Hist. (i. e., Mém.) Acad. Roy. Paris, for 1787, p. 503, 1789: near Algiers.

Specimens collected:

Male adult, Tana River, Kenya Colony, August 19, 1912.

The color of the soft parts was recorded by Doctor Mearns as follows: Iris red; cere, basal three-fifths of commissural line, and extreme base of mandible pale yellow; maxilla and nearly all of mandible bluish black; feet pale yellow; claws black.

This is one of the relatively few hawks in which the two sexes are fairly similar in size, the difference between them being an average rather than an actual one. The largest female examined has a wing length of 267.5 millimeters, while that of the largest male is 264. A bird marked as a male with a query, which may be either a male or a female, has the longest wing of any specimen seen—274.5 millimeters.

Swann[99] recognizes three races of the black-winged kite, as follows:

Typical *E. c. coeruleus*—Africa, Madagascar, Palestine, and southwest Asia (?).

E. c. vociferus—India, Ceylon, Burma, Yunnan, and Assam.

E. c. hypoleucus—Philippine Islands, Java, Sumatra, Borneo, Celebes, and Sula Islands.

In the Museum of Comparative Zoölogy I have carefully examined a good series of each of these races and find that *vociferus* is not valid. It is supposed to be smaller than typical *coeruleus* (wing; 255–272 as against 272–285 millimeters) and the primaries are said to be paler below, dark slate color, the base more or less whitish. These differences do not hold. The color differences are not constant and the variations are due to age, wear, and possibly sex. The measurements given for the typical race (wing 272–285) are too high as the following measurements show. There certainly is but one form in Africa, and it seems as though Indian, and southern Asiatic birds generally, can be matched by African examples. In the following table the African birds are listed first.

Locality	Sex	Wing	Tail	Culmen
Kenya Colony:				
Tana River	♂ adult	264. 0	119	17. 0
Nairobi	? ♂ immature.	254. 0	119	16. 0
Uganda:				
Nasambier	♂ adult	259. 0	120	17. 0
Do	♂ immature	257. 0	127	15. 5
Belgian Congo Kamaniola	do	257. 0	123	16. 0
South Africa	♂ (?) adult	264. 0	122	16. 5
Tanganyika Territory, Morogoro.	♀ adult	262. 0	130	17. 5
Kenya Colony, Nairobi	♀ immature	260. 5	128	16. 5
Uganda:				
Nasambier	♀ adult	258. 5	------	17. 5
Do	♀ immature	267. 5	128	16. 5
Liberia, Gbanga	♀ adult	264. 5	120	18. 0
South Africa:				
Cape of Good Hope	--------------	257. 0	121	16. 0
Natal	--------------	269. 5	128	17. 0
India:				
Near Amballa	Adult	274. 0	129	16. 5
Do	Immature	268. 0	134	-------
Do	do	266. 5	132	16. 5
Ceylon	♂ adult	257. 5	115	17. 0
Cochin China	♂ (?)	274. 5	135	18. 0
Assam, Junnipur	♀	266. 0	120	-------

According to Erlanger[1] the black-shouldered kite is more common in southern Somaliland than in Gallaland or Shoa. The Frick expedition did not meet with this bird in the interior of Ethiopia, an experience in keeping with that of Erlanger, Neumann, etc. The only entries dealing with this species that I find in Mearns' notes are the following: Lekiundu River, August 4–8, 18 seen; Meru, August 9, 6 birds noted; Tharaka district, August 13, 2 seen; Tana River, August 14–23, 6; Athi River, August 31 and September 1, 9 birds observed.

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[99] Synopsis of the Accipitres, ed. 2, 1922, pp. 160–161.

[1] Journ. f. Ornith., 1905, p. 211.

AQUILA VERREAUXI Lesson

Aquila verreauxi Lesson, Cent. Zool., p. 105, pl. 38, 1930: In the interior of the Cape of Good Hope.

Unfortunately no specimens of this bird were collected but Mearns entered the following observations in his field notes under the present species: Box Canyon, south end Lake Rudolf, July 9, 1 bird; Indunumara Mountains, July 14–18, 4 birds; Endoto Mountains, July 19–20, 2 seen. If the birds were really *verreauxi*, these observations constitute the first records for the species in Kenya Colony. I include them here, not so much for their own sake (as the identification is only a sight one) but in the hope that they may incite collectors in Kenya to watch for this eagle.

AQUILA RAPAX RAPTOR Brehm

Aquila raptor A. E. Brehm, Naumannia, 1855 ,p. 13: Blue and White Nile.

Specimens collected:

Female, Dire Daoua, Ethiopia, November 29, 1911.
Male, Dire Daoua, Ethiopia, November 28, 1911.
Male, (?) Dire Daoua, Ethiopia, December 5, 1911.
Female, Dire Daoua, Ethiopia, December 4, 1911.
Male, (?) Dire Daoua, Ethiopia, December 10, 1911.
Male and female, Sadi Malka, Ethiopia, January 30, 1912.
Male, Adis Abeba, Ethiopia, December 28, 1911.
Female immature, Adis Abeba, Ethiopia, January 11, 1912.
Female, Adis Abeba, Ethiopia, January 11, 1912.
Male nestling, Hokaki, Ethiopia, January 15, 1912.
Female, Arussi Plateau (9,200 feet), Ethiopia, February 25, 1912.
One unsexed (foot only), Arussi Plateau (9,200 feet), Ethiopia, February 24, 1912.
Female (foot only), Loku, Sidamo, Ethiopia, March 5, 1912.
Female (foot only), near Loku, Sidamo, Ethiopia, March 6, 1912.

These specimens together with the combined series in the United States National Museum and the Museum of Comparative Zoölogy illustrate all ages and plumages of this eagle.

The youngest specimen, a male nestling (U.S.M.N. 243618) taken at Hokaki, Ethiopia, on January 15, 1912, has the eye region and lores practically naked. The anterior parts of the cheeks are likewise bare but posteriorly they are covered with whitish down, the covering increasing in density toward the auriculars. The entire body is densely coated with white wholly down through which the quills are appearing on the wings, tail, and interscapular region. On the upper side of the head the down is particularly long and the terminal barbs quite hairlike in their free prolongations. The claws and bill are black.

There has been some doubt as to whether the darkest birds were juvenal and the light tawny ones adult or vice versa. Hartert[2] worked out the sequence of plumages and concluded that the dark brown birds are adults and that it takes five or six years to achieve the dark plumage. Zedlitz[3] came to similar conclusions as a result of his study. The late Doctor Mearns felt, however (as expressed in his scattered manuscript notes), that the reverse was true; namely, that the dark birds were year-old birds and that they took several years to acquire the light tawny plumage. However, the wing quills growing out in the nestling are light brown like the remiges of the tawny birds—a clear indication that Hartert and Zedlitz are correct in their statements. The condition that obtains in this eagle is therefore the reverse of the situation in the golden eagle where the immature birds are very dark, almost black, and the older ones lighter in color.

The nestling plumage is followed by a complete postnatal molt which brings on the juvenal plumage. This molt takes place while the birds are in the nest and starts at about two weeks after hatching (to judge by the size of the nestling examined). The remiges, some of their upper coverts, and the interscapulars are the first feathers of this plumage to appear, and are quickly followed by the rectrices. The juvenal plumage is tawny brown or pale coffee brown, more or less uniform, but slightly lighter on the abdomen than elsewhere. The shafts of the feathers of the underparts are slightly darker than the vanes and appear as faint median streaks of darker brown. Hartert writes that the throat is somewhat lighter than the rest of the underparts in this plumage. This I am unable to confirm in *raptor* but I have seen examples of typical *rapax* in which it holds good. The remiges are fuscous brown or brownish black, the intensity of the color being quite variable.

According to Hartert this plumage fades and becomes paler and lighter, and, in no great length of time, becomes entirely pale brownish yellow, almost whitish. This undoubtedly does occur, as a male from Dire Daoua, Ethiopia (U.S.N.M. 243610) is in this very light plumage, but I doubt if it happens with any great degree of regularity. With the exception of this one bird, all other juvenal specimens examined are in the unfaded condition and are molting into the subadult plumage.

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[2] Vögel der pal. Fauna, pp. 1095–1096.

[3] Journ. f. Ornith., 1910, pp. 379–382.

In the juvenal plumage the tail is said to be unbanded (according to Hartert), but one bird (U.S.N.M. 243613) has faint bands on the central rectrices. However, as the rectrices become worn the finer structures of the vanes (radii and cilia) are worn away, and distinct dark crossbars appear on the feathers, these varying in pattern from modified V and U shapes to nearly straight transverse bars.

The postjuvenal molt is more or less irregular, but seems to begin on the head and nape as early as anywhere and involves the upper parts to a large degree before spreading to the under parts.

The next plumage may, for want of a better term, be called the immature stage. This apparently exists in two phases which are independent of sex or locality. Some birds molt into a plumage similar to the juvenal type but with blacker remiges and somewhat darker tails. Others become much darker all over, more or less uniform dark, dull earth-brown, except for the wings and tail. The primaries are blackish or fuscous black narrowly tipped with whitish and basally barred with whitish; the secondaries dark grayish brown irregularly banded with blackish and broadly tipped with whitish, and the greater upper coverts also broadly tipped with white. The rectrices are dark grayish with a browish tinge, irregularly barred with blackish and tipped with white. Hartert[4] gives only this latter plumage. This immature plumage seems to be worn for at least two years and then is replaced by the subadult plumage.

The subadult plumage is first indicated by the sporadic, irregular replacement of the immature feathering by darker feathers. The upper parts become very dark brown, but never uniformly so, as by the time the last of the immature feathers are replaced, the first of the adult ones are already grown, so that this plumage is apparently worn only a short time. The lower throat and breast in this plumage are quite different from the abdomen (which remains as it was in the immature stage). The throat and breast are clothed with dark brown feathers, each of which has a long rusty-brown or pale earth-brown median stripe. As Hartert has pointed out, all individuals do not seem to go through this plumage, but some molt directly from the immature into the adult feathering. However, of those individuals that go through this subadult stage there are two types, depending on which immature phase is involved. If the light phase is involved, the abdomen remains light tawny in this plumage; if the dark phase is the one, then the abdomen is correspondingly dark in the subadult plumage. The former is very striking, the contrast between the dark breast and light abdomen being very marked. A male collected at Sadi Malka (U.S.N.M. 243619) is of the light phase in an early stage of the molt into subadult plumage, while a female from Adis Abeba (U.S.N.M. 243616) represents the extreme development of the light phase of the subadult plumage, but still has many of the feathers of immaturity on the top of the head. No specimen of *raptor* in dark subadult plumage has been examined, but a male of the typical form *rapax* in this plumage (U.S.N.M. 214081) has been studied. It is not well advanced in its molt and does not show the plumage (on the upper parts at least) as well as the female above mentioned.

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[4] Vögel. pal. Fauna, pp. 1095–1096.

The dark adult plumage is more or less uniform, very dark brown. Birds in fresh plumage are nearly black. The transition on the breast is rather interesting as the new (adult) feathers have narrow, terminal, median light streaks and tips, much like those of the subadult plumage, only very much smaller. These tips wear off, leaving the breast uniformly dark.

The typical form *Aquila rapax rapax* is said to be much more reddish in all plumages than *raptor*. This is true when series are compared, but it does not always hold for individuals. This seems especially true in the juvenal plumage. Birds from Kenya Colony are more or less intermediate, but seem closer to the southern *rapax* than to *raptor*.

The specimens collected present no unusual size measurements. The females have wings of from 530–563; the males, from 503–519 millimeters.

Besides the specimens collected, Mearns noted this eagle at the following localities: Aletta, March 7–13, 4 birds; Loco, March 13–15. 2; Gato River, March 29 to May 17, 20 noted; Bodessa and Sagon River, June 3–6, 4 seen; Wobok, June 18, 25 birds; near Saru, June 19, 10; Karsa Barecha, June 21, 4 seen; Guaso Nyiro River, July 31 to August 3, 2; Athi River, August 29, 2 birds seen and a nest found. Mearns made the following entry in his journal at Adis Abeba, January 7.

> Several were noted along the railway below Dire Daoua. These birds were quite numerous and stupidly tame in the town of Dire Daoua where we collected four skins. They fed on dead camels in company with dogs, vultures, and crows. When satisfied, they flew to the nearest mimosa trees and sat through most of the day paying no regard to the people passing by. Sometimes they betook themselves to high flights, uttering loud cries, and chasing one another, probably in courtship. About 20 miles below Adis Abeba we found a pair of eagles and a pair of yellow-billed kites building nests in a mimosa tree beneath which we rested ourselves. This was on December 26.

They paid but slight attention to us, working at the nests and going for more materials.

These observations recall those of Blanford[5] who found the bird common, and obtained specimens both in the highlands and in the low coastal plains of Samhar.

> "It breeds on the highlands about January. I saw one nest on the top of an isolated tree near a village, containing a young bird almost full grown, on March 24. Several of these eagles frequently collected about carcasses in company with vultures, *neophrons*, and crows."

LOPHAËTUS OCCIPITALIS (Daudin)

Falco occipitalis DAUDIN, Traité, vol. 2, p. 40, 1800: the Anteniquoi country, *i. e.*, Knysna district, Cape Province.

Specimens collected:

Male adult, Aletta, Sidamo, Ethiopia, March 7, 1912.

Five male adults, Gato River near Gardula, Ethiopia, April 3–29, 1912.

The colors of the soft parts of one of the specimens collected were recorded by Mearns as follows: Cere and commisural margin yellow; basal half of bill greenish gray, distal half black; toes yellow, claws black; iris yellow.

Swann[6] writes that the tail has three grayish bands on the middle feathers, becoming broader and whitish on the outer ones. This character does not hold and is extremely variable regardless of age, sex, or season. Some specimens have as many as six or seven light bands on the middle rectrices, whereas in others only three are present and, in one case, these three are not true bands but merely pairs of disconnected spots, one in each web, corresponding to the bars.

Reichenow[7] writes that the tarsal feathering is white in adults and white mixed with brown in younger birds. Erlanger[8] also notes this. Zedlitz[9] modifies this somewhat by saying that some adult individuals have a more or less yellowish tinge to the tarsal feathers. However, in a series of 18 specimens (chiefly adults) I find that this character is quite variable. Relatively few specimens have these parts pure white. In some presumably adult birds the tarsal covering is more brownish than white; in others the feathers are white with brownish-black shafts. It may be that very old birds have the tarsi pure white, but many breeding birds have them mixed with brown. Thus, Van Someren[10] collected a female. "* * * in breeding condition, though not in full adult plumage."

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[5] Geol. and Zool. Abyss., 1870, pp. 295–296.

[6] Synopsis of the Accipitres, ed. 2, 1922, p. 122.

[7] Vög. Afrikas, vol. 1, p. 583.

[8] Journ. f. Ornith., 1904, pp. 187–188.

[9] Idem, 1910, p. 377.

[10] Nov. Zool., vol. 29, 1922, p. 41.

Other variable factors are the number of bars on the outer and the inner webs of the outermost primary. On the outer web the number varies from one (the terminal dark bar) to five; on the inner web from three to five.

The wing measurements given by Swann[11] are too small. According to him, the wings of male birds measure from 385–390, and of females 396 millimeters, while the series before me gives the following limits: 365–397 millimeters in the male and 393–400 in the female.

One of the birds collected at Gato River had an entire rat, apparently recently eaten as it had the skin and hair on it, in its stomach.

The crested hawk eagle occurs throughout Africa south of the Sahara, and in all this enormous range has not become differentiated into geographic races. The Frick expedition observed it at the following places: Aletta, March 7–13, 12 birds; Loco, Gidabo River, March 13–15, 2 seen; Abaya Lakes, March 18–26, 5 individuals; Gato River, March 29 to May 17, 54 seen; Bodessa and Sagon River, May 18 to June 6, 10 birds; Meru and Kilindini, August 10, 2 seen; Tana and Thika Rivers, August 23–27, 8 birds; west of Ithanga Hills, August 28, 4 seen; Athi River, August 29–30, 10; Escarpment, September 4–12, 4 birds seen.

Mearns noted that this eagle may be partly nocturnal as it frequently cries at night as well as during the day.

TERATHOPIUS ECAUDATUS (Daudin)

Falco ecaudatus DAUDIN, Traité, vol. 2, p. 54, 1800: Pays d'Anteniquoi; i. e., Knysna district, Cape Province.

Specimens collected:

Male, Sagon River, Ethiopia, June 4, 1912.

The bateleur is widely distributed thoughout Africa from the Cape Province north to the southern limits of the Sahara from Senegal to the Anglo-Egyptian Sudan, Ethiopia, and Eritrea, and, while variable in the sense of having color phases, is not divisible into geographic races.

The single specimen collected is rather small, having a wing length of 510 millimeters. Swann[12] records the wing length of the male as 532 millimeters. The present specimen has grayish shoulders, but has black greater upper wing coverts. The figure in Von Heuglin's "Ornith. Nordost-Afrikas,"[13] of his variety *fasciatus* has the greater wing coverts brown.

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[11] Synopsis of the Accipitres, ed. 2, 1922, p. 122.

[12] Idem, 1922, p. 140.

[13] Vol. 1, pl. 2, fig. 2.

Aside from *fasciatus* (with the secondaries with a broad silvery-gray band) which is a synonym of *ecaudatus*, one other name has to be taken into consideration—*Helotarsus leuconotus* Rüppell,[14] characterized by having the back light creamy fulvous instead of maroon. However, this plumage, which Reichenow [15] considered to be that of very old *ecaudatus*, is nothing but a color phase that occurs not infrequently throughout the entire range of the species. This was demonstrated by Zedlitz,[16] who writes that a bird lived in the Zoological Park in Breslau for 11 years in *leuconotus* plumage, and that others in Breslau and in Berlin lived for many years in the dark *ecaudatus* type of feathering. Also a bird not more than two years old with a light, almost whitish back (*leuconotus*) was taken at Khartoum. No specimen molting from maroon to creamy color or vice versa is known in any collection. Zedlitz made a mistake when he said that *leuconotus*-plumaged birds occur from Sudan to Togo and east Africa together with reddish *ecaudatus*, but not south of there. Sharpe [17] lists two *leuconotus* from South Africa. C. Grant recorded *leuconotus* from Beira, Mozambique.

The name *fasciatus* is based on an adult female. The evidence advanced by Erlanger,[18] Zedlitz,[19] and others, is sufficient to establish as proved the fact that the adult female of the bateleur has the secondaries silvery gray tipped with black, while the male has these feathers blackish. In the American Museum of Natural History there is a bird with silvery gray, black-tipped secondaries, labeled a male. This bird, however, is one of a collection made by Capt. Keith Caldwell's native skinners, and the sexing is therefore quite unreliable. Native African bird skinners have great difficulty with birds of prey in nonbreeding condition, perhaps because of the two ovaries so often present.

Erlanger [20] collected a number of adult females in Ethiopia (Shoa and Gallaland) and Somaliland, and found them to have silvery gray secondaries tipped with black. He compared them with four adults (sex not stated, but apparently males, although he thought them to be females) from east Africa and found that these birds lacked the gray color. He thereupon concluded that the broad gray band on the secondaries is a sign of old age, but that the birds of equatorial Africa never get this plumage which is found both in northeastern and in South Africa. He goes on to suggest that there are two species involved. This, of course, is not so, as birds of the gray-banded type (adult females) have since been taken in Tanganyika Territory, Kenya Colony, Uganda, and the Belgian Congo.

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[14] Syst. Uebers., p. 10, 1845.

[15] Vög. Afr., vol. 1, p. 598.

[16] Journ. f. Ornith., 1910, pp. 386–388.

[17] Cat. Birds Brit. Mus., vol. 1, 1874, p. 301.

[18] Journ. f. Ornith., 1904, pp. 198–201.

[19] Idem, 1910, pp. 386–388

[20] Journ. f. Ornith., 1904, pp. 198–201.

Zedlitz collected four young birds, which, judging by his comments, are peculiar. One (his No. 764), not yet a year old, has the under parts strongly flecked with white, and has a pure white chin. Another (his No. 1331), apparently not any older, is darker on the whole, with light tips to the feathers. A third (his No. 1284) has no light tips to the feathers and is in general dark brown in color. It may be a year-old bird. The fourth (his No. 856), probably two years old, has many black feathers showing between the brown ones and is molting into adult (?) plumage.

An immature bird in the United States National Museum (U.S.N.M. 214842) has the chin largely whitish, the rest of the under parts brown, each feather tipped with white; the brown being darkest on the lower breast, lighter and redder on the abdomen, palest on the upper throat; the flanks are darker brown and the thigh feathers are very dark brown with subterminal rufous bars and narrow white terminal edges. The upper parts are brownish, the feathers of the head and nape paler than those of the interscapulars and back and edged with light brownish white, while the interscapulars and back have reddish brown edges. The upper wing coverts have narrower and paler, slightly more grayish edges than the interscapulars, and are slightly darker otherwise. The primaries are blackish with silvery gray brown outer webs and the secondaries are dull gray brown like the rectrices, and, like them, are tipped with tawny. The under wing coverts are rich rufous brown with white tips, with the exception of the greater under wing coverts which are pale brownish gray with white tips; the under tail coverts are rufous brown without lighter tips.

All the light tips wear off, making the birds thereby become darker. Another specimen in the National Museum (U.S.N.M. 76945) illustrates this stage but has acquired a good number of new, darker feathers.

Mouritz [21] writes that:

> "The fully adult plumage in the female, distinguishable from the male by the broad black edging to the secondaries, does not seem to be attained until the fourth year. The third year's plumage I believe to be very little different, however, from the fourth, albeit still considerably speckled with brownish feathers; whilst the second year's is practically similar to that of the first year's, with cere and feet bluish, and perhaps lacking the light emarginations to many of the feathers of the mantle and underparts. I also believe that the female is not infrequently to be found breeding in immature plumage."

With all this I agree.

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[21] Ibis, 1915, p. 205.

Lynes [22] calls attention to a third color phase—white backed with a white tail, and only a slight dusky-looking blemish on the rump interrupting the continuity of the white from back to tail.

The bateleur was frequently observed throughout the course of the expedition, as the following records extracted from Mearns' diary show: Aletta, March 7–13, 6 birds; Loco, March 13–15, 2 seen; Gidabo River, March 15–17, 1; Abaya Lakes, March 23–26, 10 seen; near Gardula, March 26–29, 8; Gato River, March 29 to May 17, 20 birds; Bodessa and Sagon River, May 19 to June 6, 11 seen; Tertale, June 7–12, 4; El Ade, June 12–14, 4 birds; Turturo, June 15–17, 12 seen; Anole, June 17, 4; Wobok, June 18, 10 noted; near Saru, June 19, 10 birds; Yebo, June 20, 4 seen; Karsa Barecha, June 21, 10; Malata, June 22, 6; Chaffa villages, June 23–25, 12 birds; Hor, June 26–30, 4 seen; Endoto Mountains, July 19–24, 16 birds; Er-re-re, July 25, 4; Le-se-dun, July 26, 2 seen; Malele, July 27, 2 noted; Northern Guaso Nyiro River, July 31 to August 3, 4; Lekiundu River, August 4–8, 10 birds; Meru and Kilindini, August 9–10, 14 seen; Tharaka district, August 12–13, 6 noted; Tana, Thika, and Athi Rivers, August 14–29, 15 birds.

CUNCUMA VOCIFER CLAMANS (Brehm)

Haliaëtos clamans Brehm, Journ. f. Ornith., 1853, p. 199, footnote: No definite type locality; I designate Shoa.

Specimens collected:

Female, Duletcha, Ethiopia, January 25, 1912.

Male, Lake Zwai, Ethiopia, March, 1912.

Brehm [23] described a small race of this bird from the Sudan and northeastern Africa and named it *clamans*. Recent writers have been far from uniform in their treatment of this form; some, such as Zedlitz, recognizing it, others, as Sclater, Reichenow, etc., considering it not valid.

Purely on geographical grounds the two specimens listed above should be *clamans* if that form be valid.

The form was characterized by Brehm as being considerably smaller than typical *vocifer*, the females of the former being no larger than males of the latter, and the males of *clamans* smaller still. Zedlitz [24] gives the following size criteria: Wing length of typical *vocifer*, 520–550 in the male, and 563–580 millimeters in the female; of *clamans*, 500–505 in the male, 520–530 in the female. Erlanger [25] gives similarly small figures for northeast African birds Of the two birds collected by Mearns, the male has a wing length of

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[22] Ibis, 1925, p. 401.

[23] Journ. für Ornith., 1853, p. 199, footnote.

[24] Idem, 1910, pp. 388–390.

[25] Idem, 1904, p. 205–207.

496 millimeters, and the female, 533 millimeters. These figures agree more closely with those given by Zedlitz for *clamans* than with those for *vocifer.*

The small birds (*clamans*) come from northeastern Africa—Ethiopia and adjacent regions of Somaliland. Western and southern birds are larger. However, Zedlitz[26] mentions a small specimen (wing 485 millimeters) from Kagano, Adamaua, a locality which I have not been able to place with certainty, but which is probably in Cameroon (?).

Sclater and Praed[27] list two males from the Sudan with wings of 528 and 535 millimeters, respectively, agreeing not with *clamans* but with *vocifer.* These authors accordingly keep the two forms united.

The evidence produced by Zedlitz, Erlanger, and by Mearns' specimens certainly indicates two distinct forms in eastern Africa—a smaller northern, and a larger southern race. The form *clamans* was described with no mention of a type locality and, for some reason unknown to me, has been supposed to occur in Ethiopia, Somaliland, and the Sudan, although, as far as I know, all Sudanese examples are large, typical *vocifer.* Zedlitz[28] writes that *clamans* is probably the form inhabiting southern Somaliland, but that only one specimen is known from there and that he was not able to see it. This specimen was collected by Révoil and went to the Paris Museum, from which institution it was sent in exchange to the United States National Museum where it now is. It is an adult male and is extremely small, even for *clamans*, having a wing only 480 millimeters long. This specimen was originally recorded by Oustalet in his report on Révoil's collection.[29]

If the range of *clamans* be restricted to Ethiopia and adjacent portions of the Somali country, size and geography would correlate each other and the two races would then be distinct. Birds from the eastern Sudan, west of the Lado Enclave are more or less intermediate, as might be expected.

There is some doubt as to the validity of the name *clamans* as no definite locality was designated by Brehm. Alfred E. Brehm collected in Egypt, Nubia, Sennar, and Ethiopia, but the chances are that the bird on which he based his form *clamans* came from Ethiopia and not from the eastern Sudan. Reichenow[30] lists specimens from Shoa as being in the Brehm collection, and also one from Khartoum in the Berlin Museum, as collected by Brehm. Judging by the data presented by Sclater and Mackworth-Praed (see above) it would seem that the small bird or birds on which Brehm based *clamans* came not from Khartoum, but from Shoa. (The birds examined by Sclater and Praed are from Sobat River, Lake No, and Kamisa.) I therefore designate Shoa as the type locality.

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[26] Journ. f. Ornith., 1910, pp. 388–390.

[27] Ibis, 1919, p. 692.

[28] Journ. f. Ornith., 1914, p. 670.

[29] Bibl. de l'Ecole des Hautes Études, 31, art. No. 10, 1886, pp. 1–14.

[30] Vög. Afr., vol. 1, 1901, p. 605.

Apparently the type specimen is not extant as Hartert[31] does not mention it in his list of the types in the Brehm collection, now deposited in the Tring Museum. In case the name *clamans* should prove to be based on a rather small example of *vocifer* from the Sudan, the next oldest name available for the small Ethiopian race would be *orientalis* Heuglin.[32]

At one time *Cuncuma vocifer* was thought to occur in southern Europe, a notion since shown to be false. Nevertheless specimens bearing European localities on their labels are in existence, but the data of these birds are undoubtedly inaccurate. A specimen of typical *vocifer* ostensibly from Greece, in the United States National Museum is to be accounted for in this way. It was received from W. Schlüter who was commissioned to get together a complete collection of European birds for the museum. At the time the present species was thought to occur in southern Europe and consequently a specimen was obtained, labeled "Greece" and included for the sake of completeness. Incidentally this particular specimen is extremely large, having a wing length of 582 millimeters.

The difference in size between *vocifer* and *clamans* may be appreciated from the following tables.

C. vocifer clamans

Locality	Sex	Wing	Tail	Culmen
Somaliland	♂	480	220	37
Ethiopia:				
Lake Zwai	♂	496	227	40
Duletcha	♀	533	249	44

C. vocifer vocifer

Locality	Sex	Wing	Tail	Culmen
"Greece"	♀	582	258	42. 0
Kenya Colony, Taveta	♀	555	233	43. 5
Uganda:				
Rhino Camp, West Nile	♀	546	252	40. 5
Do	♀	534	262	44. 0
Do	♂	520	230	39. 0
Do	♂	528	230	39. 5
Do	♂	515	227	41. 0

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[31] Nov. Zool., 1918.

[32] Journ. f. Ornith., 1863, p. 8.

Aside from the specimens collected, this eagle was observed at the following places—Loco, Gidabo River, March 15–17, 2 seen; Abaya Lakes, March 18–26, 56 birds; Tana River, August 14–16, 8 seen; Thika River, August 23–28, 8 noted; Athi River, August 29–31, 4 birds seen. The Kenian observations (Tana River to Athi River) refer to typical *vocifer*, although it may be that the two races intergrade in Tanaland.

The African sea-eagle is a widespread, abundant bird in Ethiopia and Kenya Colony. Thus, Neumann [33] noted it on every lake and sizable stream throughout his journey across Shoa and the Hawash region. Erlanger [34] found it similarly ubiquitous and numerous. According to Von Heuglin, the mating season in northeastern Africa is in February and March, but Erlanger found two fledglings in December near the Abaya Lakes, and deduced from this that the breeding season must be in October and November. Von Heuglin's notes need not necessarily be taken as contradictory, however, as many birds of prey mate for life and are thus to be found in pairs even during the nonbreeding season.

GYPAËTUS BARBATUS MERIDIONALIS Keyserling and Blasius

Gypaëtus meridionalis Keyserling and Blasius, Wirbelth. Europ., p. xxviii, 1840: South Africa.

The African lammergeyer was observed but once, a single bird seen at Adis Abeba on January 7. It was not collected. Its absence in Mearns' notes is rather surprising as Erlanger [35] and Neumann [36] and others found it to be quite common in Arussiland, Gallaland, and Shoa. Both of the authors mentioned consider the northeast African bird distinct from the typical South African *meridionalis* and recognize Savigny's name *ossifragus* [37] for their Ethiopian material. I have seen no specimens on which to judge this matter and therefore adhere to my policy of following Sclater's list in all cases where I am not able to judge for myself.

BUTEO RUFINUS RUFINUS (Cretzschmar)

Falco rufinus Cretzschmar, in Rüppell's Atlas, p. 40, pl. 27, 1829: Upper, Nubia, Schendi, and Sennar.

Specimens collected:

Male, near Ankober, Ethiopia, January 21, 1912.

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[33] Journ. f. Ornith., 1904, p. 368.

[34] Idem, 1904, pp. 205–207.

[35] Idem, 1904, pp. 201–205.

[36] Idem, 1904, p. 368.

[37] Syst. Ois. d'Égypte, 1809, p. 78.

Hartert[38] has shown that *Accipiter ferox* Gmelin[39] is not a *Buteo* but probably a synonym of *Circaetus gallicus*, and consequently it must be abandoned for the present species, currently known as *Buteo ferox*. Vieillot's name *Circus pectoralis*[40] being uncertain, the next available name is *Falco rufinus*.

Sclater lists this species[41] under the more widely known name *ferox*, but, as indicated above, this is wrong. The name *rufinus* was originally applied to the rufescent phase of this hawk on the assumption that it was specifically distinct from the darker bird then known as *ferox*. As late as 1904 Neumann[42] considered the two racially distinct. I have not sufficient material to investigate this question, but follow Zedlitz,[43] Hartert,[44] Sclater,[45] and others in considering them merely color phases.

This buzzard breeds in southeastern Europe, western Asia, and in Egypt, and winters south to Ethiopia and the Sudan. It does not occur as far south as the southern limits of either of the latter two. Heuglin writes that it is a winter visitor along the Nile south to the Abyssinian lowlands, eastern Sennar, Taka, and Mareb, in which regions it arrives in August and September and leaves for the north in March. Sclater and Praed[46] say that it winters only in the northern portion of the Anglo-Egyptian Sudan. The westernmost part of the winter range appears to be north and central Darfur, where, according to Lynes,[47] it is a common bird in the Jebel Marra Mountains, "* * * and perhaps more widely distributed." This bird appears to be less common in Ethiopia than in the Sudan, but this is probably to be accounted for by the greater altitude of the former country. It would perhaps be more accurate to describe the winter range of this hawk as comprising the northern Sudan from Darfur east to the valleys of the White and Blue Nile, as the Ethiopian records are all from places in the drainage basin of the Nile system.

BUTEO RUFOFUSCUS AUGUR (Rüppell)

Falco (*Buteo*) *augur* Rüppell, N. Wirbelth., Vög., p. 38, pl. 16, 1836: Abyssinia (Ethiopia).

Specimens collected:

Male, Adis Abeba, Ethiopia, December 31, 1911.
Male, Alaltu, Ethiopia, January 15, 1912.

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[38] Vög. pal. Fauna, vol. 2, p. 1189, footnote.

[39] Nov. Comm. Acad. Petrop., vol. 15, p. 442, pl. 10, 1771: Astrakan.

[40] N. Dict., vol. 4, p. 477, 1816.

[41] Syst. Avium Ethiop., 1924, p. 66.

[42] Journ. f. Ornith., vol. 53, 1904, p. 366.

[43] Idem, 1910, p. 383.

[44] Vögel pal. Fauna, p. 1115.

[45] Syst. Avium Ethiop., 1924, p. 66.

[46] Ibis, 1919, p. 699.

[47] Idem, 1925, p. 408.

Female immature, Alaltu, Ethiopia, January 16, 1912.
Male, near Saleish, Ethiopia, January 18, 1912.
Male, near Ankoba, Ethiopia, January 21, 1912.
Male immature, Arussi Plateau, Ethiopia, February 17, 1912.
Male, Arussi Plateau, February 28, 1912.
Two males, Arussi Plateau, Ethiopia, February 29, 1912.
Male, Cofali, Ethiopia, March 2, 1912.
Male, Gato River near Gardula, Ethiopia, April 16, 1912.
Male, Gato River near Gardula, Ethiopia, April 18, 1912.

The colors of the soft parts are recorded by Mearns as follows: Subadult male in light phase—cere, commissural margin, and feet yellow; bill bluish gray at base, the rest black; claws, black. Of an adult male in dark phase he noted—cere, gape, and feet yellow.

One of the birds had some frogs and a toad in its stomach.

The immature male from Arussi Plateau, February 17, was taken from a nest 30 feet up in a juniper tree. The nest was made of sticks lined with grass and fresh juniper.

The two males taken on February 29 in the Arussi Plateau, the bird from Cofali, and the one collected April 18 near Gardula, are in the black phase, the others in the light phase.

The plumages of this buzzard are quite bewildering at first glance but, if we keep in mind that the species is dichromatic it is quite feasible to bring the various plumages into an orderly sequence. Two previous writers have already attempted to do this.[48] Swann's account [49] leaves much to be desired. With their observations and conclusions and the long series of specimens in the United States National Museum and the Museum of Comparative Zoölogy as a basis, I offer the following account of the plumages and molts of *Buteo rufofuscus augur.*

1. *Natal down.*—I have seen no specimens in this plumage, but judging from the down left on a bird in advanced postnatal molt, it is very light brownish gray.

2. Juvenile plumage acquired by a complete postnatal molt while the bird is in the nest.

The two color phases first appear in this plumage, and are present in all subsequent ones. For convenience we may refer to the light phase as "A" and the dark phase as " B," as has been done by C. H. B. Grant.[50]

A. Upper parts varying from Prout's brown to pale fuscous, more or less uniform in any single specimen, but not infrequently lighter on the head than on the back; remiges and rectrices with a grayish (silvery in the remiges) tinge and barred with fuscous brown; underparts whitish, the chin, throat, and breast with large tear-shaped splotches of pale mummy brown, the thighs tawny rufous.

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[48] Neumann, Journ. f. Ornith., 1904, pp. 362–364 and C. H. B. Grant, Ibis, 1915, pp. 243–244.

[49] Monogr. of the Birds of Prey, pt. 6, Sept. 1926, pp. 385–386.

[50] Ibis, 1915, p. 243.

B. Upper parts similar to A but with the general color darker and all the feathers (except those of the head) edged with rufous brown; remiges with almost none of the silvery gray tinge, the outer three very dark terminally and unbanded, the rest dark grayish brown barred with fuscous; the rectrices as in A but washed with chestnut, all the tail feathers tipped with chestnut; underparts tawny cinnamon; chin and throat narrowly streaked with blackish, the breast and forward part of abdomen with large dark-brown blotches.

This plumage seems to be retained until the following year. When the bird is nearly one year old it undergoes a postjuvenal molt. I can not be quite certain if this molt is complete or not, but it seems to involve only the feathers of the body and head and not the wings and tail.

3. The immature plumage is as follows:

A. Similar to the juvenal plumage but darker above, underparts less spotted except on the chin and throat; thighs whitish, not tawny rufous, tail still barred.

B. Similar to the juvenal plumage of this phase but darker. General color sooty brown above and below. I have seen no specimens of this plumage but feel that it (plumage No. 3 of Claude Grant's account) is the immature plumage of the dark phase, not the juvenal plumage as was indicated by Grant. The juvenal plumage that I have described above is taken from a bird taken from a nest and, obviously, can be no other than the first pennaceous feathering.

4. The subadult plumage is acquired by what seems to be a complete molt.

A. Upper parts varying from fuscous black to black, the remiges black terminally, otherwise (with the exception of the outermost pair) grayish, barred narrowly with brownish, the innermost secondaries almost whitish barred with earth-brown and broadly tipped with fuscous brown; tail and upper tail coverts bright chestnut. The rectrices vary in that some have a narrow subterminal blackish band, others a blackish spot on the outer tip of each vane, while still others have no blackish at all. Occasionally the outer pair have several narrow fuscous bars. The central pair of rectrices are the first to grow in, and the tail molt is centrifugal. Underparts white, the chin and throat largely blackish; under wing coverts white, broadly tipped with black.

B. Upper parts varying from dark fuscous to black; wings as in corresponding plumage of the light phase; upper tail coverts bright chestnut, very broadly tipped with black; rectrices bright chestnut tipped with black; the outer web of the outermost pair more or less distinctly barred with black. (In one specimen the outer web is grayish distinctly barred with 13 black bands while the inner web is unbarred and chestnut in color. Occasionally the outer web of the next pair of rectrices is also somewhat banded.) Underparts black except for the under tail coverts which are tawny to chestnut broadly tipped with black; the greater (lowest row) under wing coverts dark gray narrowly banded with from three to six white bars.

5. Adult plumage.

A. Similar to the subadult but with the chin and center of throat pure white, and the black tips of the under wing coverts much reduced or wanting, and the tail feathers with less blackish terminally.

B. Similar to the subadult but with general color black, never fuscous, and greater under wing coverts dark gray with no white bars.

It seems as though the adult plumage is not acquired before the fourth year. The tail in the adult and subadult plumages is usually shorter than in the juvenal and immature stages.

It may be noted that Neumann[51] records intermediates between banded and unbanded tails in this species, and consequently hesitates to say whether the banded rectrix is a juvenal character. What he had were probably subadult birds. In a species with the complex plumage transformations and color phases of the present one, such aberrancies are not surprising.

The species breeds in subadult as well as in adult plumage. A female in the former plumage collected by Arthur Loveridge at Shandwa, Tanganyika Territory, was shot off a nest containing two eggs. The breeding season in Ethiopia is apparently somewhat different from that in equatorial east Africa. Swann[52] records eggs on October 25 and August 22 in Kenya Colony, and on September 15 in Nyasaland. Loveridge's Tanganyika record was made on October 23. Yet Mearns collected a juvenal bird still in the nest in the Arussi Plateau on February 17. Allowing two months for incubation and growth of the bird, the egg date would be about the third week in December.

Neumann[53] notes that at altitudes over 2,800 meters (9,400 feet) he saw only the white-bellied phase of this buzzard, while lower down the two phases were found. Mearns collected the dark phase at altitudes of from 4,000 to 9,000 feet (1,200 to 2,750 meters), and the light phase likewise up to 9,000 feet.

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[51] Journ. f. Ornith., 1904, p. 363.

[52] Monogr. of Birds of Prey, pt. 6, 1926, p. 386.

[53] Journ. f. Ornith., 1904, p. 363.

The species *Buteo rufofuscus* has three good races—the typical form of South Africa characterized by the chestnut breast, the present race extending from Ethiopia to Southern Rhodesia, and the Somaliland form *archeri* with rufous underparts.

This hawk was observed in many places during the trip—Loco, Gidabo River, March 13–15, 2 seen; the Abaya Lakes, March 20–26, 14 birds; near Gardula, March 26–29, 4; Gato River, March 29 to May 17, 4 birds; Bodessa and Sagon River, June 3–6, 5 seen; Tertale, June 7, 2 birds; Turturo, June 15–17, 2 seen; Wobok, June 18, 2; the plains at the base and south of Endoto Mountains, July 19–24, 4 seen; Er-re-re, July 25, 2; Le-se-dun, July 26, 2; Malele and the district immediately south of it July 27–30, 4 birds; Lekiundu River, August 4–8, 8 birds noted.

ACCIPITER MINULLUS (Daudin)

Falco minullus Daudin, Traité, vol. 2, p. 88, 1800: Gamtoos River, Cape Province (from Levaillant).

Specimens collected:

Male, immature, Wobok, Ethiopia, June 19, 1912.

The supposed geographic races of this hawk are rather poorly understood, and, as a consequence great diversity of treatment has been accorded them. The typical form is the southern one, the Gamtoos River, Cape Province, being *terra typica* for the species. A tropical, eastern form *tropicalis*, a northeastern form *intermedius*, and a western form *erythropus* have been recognized by some recent authors, such as Sclater.[54] C. H. B. Grant[55] and Swann[56] regard *tropicalis* as a synonym of *minullus*. Lönnberg[57] refers birds from Nairobi to *intermedius*, as do also Zedlitz[58] and Granvik,[59] while Van Someren[60] records specimens from Nairobi, Fort Hall, and Kyambu as *tropicalis*. According to Sjöstedt[61] the birds of the Kilimanjaro district are *intermedius*, while both Zedlitz and Granvik feel that *tropicalis* is the coastal and subcoastal form in east Africa.

I have brought together all the material available in American museums, have critically examined the specimens, some 23 in number, and have come to the following conclusions: The so-called race *tropicalis* is indistinguishable from typical *minullus* and the former name becomes a synonym of the latter; the western *erythropus* is a distinct species; the northeastern *intermedius* is not recognizable, having no well-defined characters.

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[54] Syst. Avium, 1924, pp. 67–68.

[55] Ibis, 1915, p. 242.

[56] Synopsis of Accipitres, 1922, p. 54.

[57] Kungl. Sv. Vet. Akad. Handlgr., 1911, p. 56.

[58] Journ. f. Ornith., 1914, p. 667.

[59] Idem, 1923, Sonderheft, p. 67.

[60] Nov. Zool., 1922, p. 41.

[61] Kilimanjaro-Meru Exp., vol. 1, 1910, p. 78.

A. intermedius was described as having lighter upper parts than *minullus*. Lönnberg[62] writes of a specimen of *intermedius* from Nairobi that, "* * * it is as dark on the back as South African specimens * * *. The sides of the head are, however, much lighter than the crown, and that might be a better characteristic than the general color of the back, if it should be possible to maintain this subspecies." According to Swann[63] *intermedius* is supposed to have the sides paler, the bars on the underparts darker and broader. I find none of these characters to hold, and can come to no other conclusion than that the race is not valid.

The western *erythropus* is a bird of the west African rain forests, whereas *minullus* is a bird of the savannas. The form *sassii* Stresemann, if valid, is a race of *erythropus*.

There is a great amount of variation in the young of *minullus*, some birds being abundantly flecked or spotted on the breast, others only sparsely marked; in some the spots are round and very large, in others, small and narrow, so as to appear almost streaked; some have the ground color of the underparts pure white, while others have it pale tawny. It may be that subspecies of this hawk may be recognized by the character of the juvenal plumage, if such a practice be feasible, but I should hesitate to do so. It must be admitted, however, that many of the European investigators who recognized *intermedius* and *tropicalis* had larger series to work with than I, but still I can not agree with their conclusions without seeing their material.

According to Erlanger[64] the breeding season (of what he calls *tropicalis*) in southern Ginir is in April, as he found a nest with three eggs on April 6.

ACCIPITER RUFIVENTRIS PERSPICILLARIS (Rüppell)

1836: Gondar, Ethiopia.

Falco (Astur) perspiccillaris Rüppell, N. Wirbelth., Vög., p. 41, pl. 18, fig. 2,

Specimens collected:

Male, Arussi Plateau (10,500 feet), Ethiopia, February 27, 1912.

The northeastern form *perspicillaris* to which the present specimen belongs is said to be much darker below than typical *rufiventris*. Erlanger[65] and Neumann[66] found the characters of this race to hold for their Abyssinian specimens. The single specimen collected by Mearns is only slightly darker than a comparable South African example and is, I assume, rather light for *perspicillaris*. In fact, it is only very slightly darker, above and below, than the colored figure of a South African bird (typical *rufiventris*) in Temminck's great work.[67] The thighs and flanks are noticeably darker than the rest of the underparts; the under tail coverts are white, while in the figure they are represented as pale grayish. In the plate the edge of the wing from the wrist joint down to the tip of the outer greater coverts is white. I have seen no white there in any of the specimens examined, but only pale tawny, and that extending for only a short distance from the bend of the wing.

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[62] Kungl. Sv. Vet. Akad. Handlngr., 1911, p. 56.

[63] Synopsis of Accipitres, 1922, p. 54.

[64] Journ. f. Ornith., 1904, p. 177.

[65] Idem, 1904, pp. 172–173.

[66] Idem, 1904, p. 361.

Neumann [68] writes that in *perspicillaris* the upper parts are almost slaty black. This is certainly not true of the present specimen in which the upper parts are slaty blue, and not particularly dark blue at that.

Many authors, following Reichenow, have recorded this species (typical form) from Togoland, on the basis of a specimen in the Berlin Museum. This is wrong, however, as the specimen in question is not *rufiventris* but *ovampensis* in juvenal plumage.[69]

Reichenow [70] writes that in the juvenal plumage the upper parts are dark brown with rusty reddish edges to the feathers, and the head rust color streaked with blackish brown. A female from South Africa in the Museum of Comparative Zoölogy (M.C.Z. No. 11566), obviously a young bird, has the back dark fuscous brown, but the top of the head is also dark, exactly like the back, not rusty brown as in Reichenow's description. The under tail coverts are white, without any rufous margins as in Reichenow's specimen. The feathers of the underparts, with the exception of the lower abdomen and under tail coverts, have dark shaft streaks. The breast feathers have apically widening, medial, brownish marks extending from the shafts, while the feathers of the flanks, sides, abdomen, and thighs are banded with rufous brown. The bands on the thighs are narrower and more blackish but the entire feathers more tinged with rufous.

What appears to be the next plumage is similar to the preceding one on the upper parts but is lighter, more cinnamomeous below; the feathers of the underparts without dark shaft streaks (except for some of the throat and breast feathers, in which the streaks are much narrower and lighter than in juvenal birds); the middle of the throat white, not streaked; sides of head cinnamomeous below the eyes; the sides of the body, flanks, and thighs nearly uniform cinnamon rufous, less banded, the breast and anterior part of the abdomen approaching this condition but still banded, the terminal bands run together; under wing coverts with dark brown bars as in juvenal birds.

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[67] Pl. Col., vol. 1, pl. 496.

[68] Journ. f. Ornith., 1904, pp. 172–173.

[69] See Stresemann, Journ. f. Ornith., 1924, p. 84.

[70] Vögel Afrikas, vol. 1, pp. 560–561.

The adult plumage is well known and needs no redescription. I have seen but one adult *rufiventris* and one *perspicillaris* and can hardly say if there is any constant difference between them with respect to the under wing coverts, but in the specimen of *perspicillaris* none of these feathers have dark shaft streaks, which are present in *rufiventris*.

The size difference between the two races is small and may not be constant. The specimen of *perspicillaris* has the following measurements: Wing, 192; tail, 150; culmen, from cere, 11 millimeters, while a male of *rufiventris* presents the following: Wing, 200; tail, 158; culmen, 11.5 millimeters. Females are considerably larger than males.

This hawk appears to be rather uncommon as all collectors in Shoa from Von Heuglin and Rüppell to Erlanger and Mearns found it on only a few occasions. Neumann[71] says that it lives only in great altitudes (about 7,200 feet or 1,800 meters), a fact which may explain its apparent scarcity.

ASTUR BADIUS SPHENURUS (Rüppell)

Falco (Nisus) sphenurus RÜPPELL, N. Wirbelth., Vög., p. 42, 1836: Dahlak Island, Red Sea.

Specimens collected:

Male adult, Gato River near Gardula, Ethiopia, April 10, 1912.

"Female" (=male) immature, Gato River near Gardula, Ethiopia, April 13, 1912.

Female nestling, Gato River near Gardula, Ethiopia, April 21, 1912.

"Male" (=female) immature, Gato River crossing, Ethiopia, May 17, 1912.

Male immature, Sagon River, Ethiopia, June 3, 1912.

Immature birds have the iris yellow, whereas in adults it is cherry red. The cere is yellow, feet yellow, claws black, the bill black, yellowish at the base of the mandible. The feet of the nestling are recorded as having been pale yellow in life.

The nestling is largely downy below, but the juvenal feathers are quite advanced on the upper parts, wings, and tail. The down is pure white and is longest on the thighs, abdomen, and lower breast, shortest on the chin and upper throat. The lores and subocular region are bare. The incoming pennaceous feathers of the juvenal plumage on the upper parts are darker, more fuscous black then the corresponding feathers in older, but still immature (or at least subadult), birds and have no rufous terminal margins. This last fact, particularly, indicates that the species takes at least three years to acquire adult plumage, the four plumages being as follows:

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[71] Journ. f. Ornith., 1904, p. 361.

1. *Natal Down.*—White.

2. *Juvenal plumage.*—Above dark fuscous or fuscous black, the rectrices dark gray barred with black; below white, the breast and abdomen (and probably the thighs as well) heavily spotted with rich rufous.

3. *Immature plumage.*—Similar to the juvenal stage but lighter above and all the feathers of the back, head, and wing coverts narrowly margined with rufous, which edgings gradually wear off. Birds in this plumage vary considerably in the intensity and size of the brown ventral spots. The flanks and sides are barred, not spotted. In some individuals the throat is pure white, unmarked with darker color, but in others it is streaked with dusky brownish gray.

4. *Adult plumage.*—This plumage is well known and needs no redescription here.

Three African forms of this hawk have been named—*sphenurus*, *riggenbachi*, and *polyzonoides*. The first and the last are the ones usually recognized, while *riggenbachi* is more or less in dispute. Hartert, Van Someren [72] and Sclater [73] conclude that it is merely a dark phase of *sphenurus*, and the facts seem to indicate the soundness of their decision, as *riggenbachi* has been taken only in places where *sphenurus* is known to occur. It is extremely unlikely that the former is a distinct species, and yet so like *sphenurus* and geographically and ecologically coincident with it.

The southern form *polyzonoides* is unusually well marked, and has been considered as a distinct species by Swann.[74] Sclater, Stresemann, and others consider it a race of *badius*. The material available to me leads me to regard it as a race of *badius* and not as a species by itself. Although the adults of the two races are quite distinct, the distinction is due merely to lack of intergrading specimens. The immature plumages of the two are similar but the brown markings on the undersides are lighter, more cinnamomeus in *polyzonoides* than in *sphenurus*.

The ranges of the two races are more extensive than usually thought. Swann [75] gives that of *polyzonoides* as South Africa north to Nyasaland, while Sclater [76] adds Northern Rhodesia and Tanganyika Territory. Loveridge collected specimens in northern Tanganyika Territory (Morogoro and Kilosa), which in no way approach *sphenurus*, but are typical *polyzonoides*. The race *sphenurus* is not mentioned by either Swann or Sclater as occurring in Ethiopia, which country must be added to the range of this race on the basis of the five specimens collected by Mearns.

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[72] Nov. Zool., vol. 29, 1922, p. 40.

[73] Syst. Avium, 1924, p. 69.

[74] Monogr. Birds of Prey, pt. 4, 1925, p. 220.

[75] Synopsis of Accipitres, 1922, p. 41.

[76] Syst. Avium Ethiop., 1924, p. 70.

The Frick expedition field party observed this hawk in the following places: Aletta, March 7–13, 1 seen; Loco, Gidabo River, March 15–17, 1 noted; Abaya Lakes, March 18–26, 13 birds; Gato River, March 29 to May 17, 10 seen; Bodessa and Sagon River, May 19 to June 6, 14 noted; Turturo, June 15–17, 6 birds; Anole, June 17, 2; Wobok, June 18, 4; near Saru, June 19, 2; Karsa Barecha, June 21, 2 birds; Malata, June 22, 2; Chaffa villages, June 23–24, 3 seen; Lake Rudolf and the country to the southeast, July 5–10, 4 birds; the plains at the base and south of the Endoto Mountains, July 21–24, 2 birds; 27 miles south of Malele, July 29, 2 seen; the Northern Guaso Nyiro River, July 31, 2 birds; Lekiundu River, August 4–8, 3 seen; Meru, August 9, 1; Tharaka district, August 13, 4 noted; Tana River, August 14–18, 9 birds; west of Ithanga Hills, July 28, 1 bird seen.

ASTUR TACHIRO UNDULIVENTER (Rüppell)

Falco (Astur) unduliventer RÜPPELL, N. Wirbelth., Vög., p. 40, 1836: Simien, Ethiopia.

Specimens collected:

Female adult, Ankober, Ethiopia, January 22, 1912.

Unfortunately the present specimen is the only example of this race that I have been able to examine. It is somewhat larger than the measurements given by Swann,[77] who apparently had measured only one female (with a wing length of 215 millimeters.) The present bird has a wing length of 224 millimeters, tail 201 millimeters, and culmen (from cere) 16.5 millimeters.

Zedlitz[78] records a female with a wing length of 220 millimeters, which also exceeds Swann's bird.

It seems that there are four recognizable races of this hawk in Africa, as follows:

1. *Astur tachiro tachiro.*—South Africa.
2. *Astur tachiro sparsimfasciatus.*—Zanzibar, Tanganyika Territory, Kenya Colony, Uganda, Rhodesia, and Angola.
3. *Astur tachiro macroscelides.*—West Africa (Gold Coast, southern Nigeria to Sierra Leone).
4. *Astur tachiro unduliventer.*—Ethiopia.

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[77] Monogr. Birds of Prey, pt. 4, 1925, p. 199.

[78] Journ. f. Ornith., 1910, p. 369.

Stresemann[79] places *toussenellii* as a race of *tachiro*, but in this respect I feel that he is wrong, and agree with Sclater[80] who gives it specific rank.

Of the other so-called forms of *tachiro* the four eastern races *nyansae*, *aceletus*, *tenebrosus*, and *orienticola* are probably nothing but individual variants of *sparsimfasciatus*, and the type of the Angola bird *benguellensis* also seems to be merely a very large example of *sparsimfasciatus*. In fact, *benguellensis* was described by Swann[81] and subsequently synonymized by him with the eastern *sparsimfasciatus*. The form *tenebrosus* described by Lönnberg[82] from Londiani, Kenya Colony, is considered by Van Someren[83] as a melanistic phase of *nyansae*, which, in turn, is not distinct.

The variation in the barring of the under wing coverts and under tail coverts varies and is not of any taxonomic significance in *sparsimfasciatus* but the under tail coverts seem to be constantly pure white in *unduliventer*. These feathers have blackish shafts in the specimen at hand. The race *unduliventer* may be told from the other three forms of *tachiro* by its generally darker color and by the throat being barred with grayish brown. It is most like *macroscelides* but has the reddish bars on the underparts darker than in the latter. The latter, according to Swann[84] has white under tail coverts as does *unduliventer*. However, five adults of *macroscelides* in the Musuem of Comparative Zoölogy have these feathers lightly barred with grayish brown.

Accipiter castanilius, a totally different bird, has been often confused with the present species, but the slenderer feet of the former make it easy to distinguish it from the latter. In plumage *castanilius* and *macroscelides* are quite similar.

I have seen the juvenal plumages of three of the four races and find the following differences. In *sparsimfasciatus* the spots on the under parts are darker and narrower, more elongate than in either *tachiro* or in *macroscelides*. They are broadest, least elongate, almost roundly triangular, in *macroscelides* and intermediate in shape in *tachiro*. The last two have relatively more barring on the flanks and thighs than does *sparsimfasciatus*, which, in turn, is more washed with brownish above, has richer brownish margins to the feathers of the crown, occiput, nape, wings, back, and tail than the others. The under tail coverts are pure white in the specimens of *macroscelides* and *sparsimfasciatus*, barred with fuscous brown in *tachiro*. The last is the most abundantly spotted below of the three; the first, the least so.

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[79] Orn. Monatsb., vol. 32, 1924, p. 6.

[80] Syst. Avium Ethiop., 1924, p. 70.

[81] Synopsis of Accipitres, 1922, p. 34.

[82] Ark. f. Zool., vol. 11, no. 5, p. 2, 1917.

[83] Nov. Zool., 1922, vol. 29, p. 40.

[84] Monogr. Bds. Prey, pt. 4, 1925, p. 198.

Just how long a time is required to assume adult plumage is not definitely known, but it seems to be acquired in the second year. A male of *sparsimfasciatus* in the Museum of Comparative Zoölogy has the adult plumage well developed, but still retains some of the immature feathers. It has upper wing coverts like those of the immature birds, and possesses some very heavily banded or barred flank feathers like those found in the juvenal plumage, contrasting strikingly with the finely barred feathers of the rest of the underparts.

The present subspecies occurs in the high mountainous regions of Ethiopia. Neumann [85] gives its altitudinal range as between the levels of 2,000 and 3,200 meters (6,600 to 10,500 feet). He writes that it does not live in the valleys where it is replaced by *Astur badius sphenurus.* Erlanger [86] procured a single specimen at Solole, southern Somaliland, which he referred to typical *tachiro.* This is obviously wrong, but there is some doubt as to whether his bird is *unduliventer* or *sparsimfasciatus.* He suggests that it is like tropical east African birds, which seems quite likely judging from geography, in which case it would have to be refered to *sparsimfasciatus.* It is doubtful if the mountain race *unduliventer* occurs in the Bardera area.

MELIERAX MUSICUS POLIOPTERUS Cabanis

Melierax poliopterus CABANIS, Journ. f. Orn., 1868, p. 413: Umba River on the Kenya-Tanganyika boundary.

Specimens collected:

"Male," Dire Daoua, Ethiopia, December 4, 1911.
Female, Bodessa, Ethiopia, June 1, 1912.
Male, immature, Le-se-dun, Kenya Colony, July 26, 1912.
Male, Tharaka District, 2,000 feet (600 meters), Kenya Colony, August 14, 1912.

The colors of the soft parts of the female are recorded as follows: Iris, hazel; cere and basal half of mandible, yellow; maxilla and distal half of mandible, black; feet, orange red; claws, black. This specimen had its crop filled with guinea hen meat—no bones or feathers.

As has been shown by Lort Phillips, Swann, and others, Neumann's race *somaliensis* is not valid. It is said to have the crown as light as the nape, but some Somaliland birds have the head as dark as in *poliopterus.*

A specimen in the Museum of Comparative Zoölogy from British Somaliland (Lort Phillips' coll.) agrees with *poliopterus*, having the crown much darker than the nape. The four birds collected by

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[85] Journ. f. Ornith., 1904, p. 360.
[86] Idem, 1904, p. 168.

Mearns are typical *poliopterus* in coloration. They constitute the northernmost records for the race; in fact, extend the known range north well into Ethiopia, whereas the form was previously unrecorded from that country.

The immature male does not agree with any published description of the juvenal plumage and is different from comparable specimens of *musicus* from South Africa and of *metabates* as well. It is much lighter above and below than *musicus* and the bars on the underparts are much narrower than in the latter. The outer, upper, middle and lesser wing coverts are terminally edged with white in the young *poliopterus*, while in *musicus* no such edges are present. Likewise the secondaries are tipped with white in the former and not in the latter. From *metabates* it differs in being darker above and below, more narrowly barred beneath, and in having white edges to the upper outer wing coverts, as mentioned above, and white tips to the secondaries. The upper tail coverts are unbarred in *poliopterus;* barred in *metabates*. From both it differs in having the under tail coverts nearly pure white, only faintly, sparsely, and narrowly barred with pale tawny, whereas the other two have these feathers heavily and abundantly marked with brown.

Sjöstedt [87] describes a young *poliopterus* which resembles the present specimen more than any other published description. Loveridge [88] writes of a nearly fledged nestling that, "* * * the lower breast shows signs of barring like the adult," which may be taken to mean that the bars were fairly narrow. The rest of the description, however, is less in agreement with the speciments I have examined. Loveridge writes that, "* * * its plumage was strikingly different from the adult. The back plumage is nearly black; it has a central gular streak. * * *"

Immature birds have the primaries largely white or whitish, banded with fuscous brown, only the outer webs and most distal inch or two of the inner webs being solid fuscous brown. In the process of assuming adult plumage, the old primaries do not molt until the body molt is very nearly complete, and then they molt from the inside out, that is, the innermost primary is shed first, the outermost one last. This explains why numbers of specimens in apparently fully adult plumage have some of the primaries of this type, instead of having them all solid fuscous as in really adult birds. Occasionally, however, adults have remiges that are slightly mottled, but the majority have them dark and uniform.

The female collected at Bodessa, Ethiopia, is unusually large, exceeding another adult female from Tanganyika Territory, in wing length, by 30 millimeters. Swann [89] gives the wing measurements of

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[87] Kilimandjaro-Meru Exp. Reports, vol. 1, p. 77.

[88] Proc. Zool. Soc. Lond., 1923, p. 915.

[89] Monogr. Birds of Prey, pt. 3. 1925, p. 169.

poliopterus as male, 295–315, female, 323 millimeters. The following measurements indicate that these figures need revision, especially with regard to females.

Locality	Sex	Wing	Tail	Culmen (from cere)
Kenya Colony	♂	312	234	20. 0
Do	♂	318	223	19. 0
Do	♂ immature	306	224	20. 0
Ethiopia	♂	311	219	20. 0
Somaliland	♂ (?)	296	213	20. 0
Tanganyika Territory	♀	325	233	22. 0
Ethiopia	♀	355	243	22. 5

According to some authors, such as Swann and Hartert, *poliopterus* and *metabates* are races of *musicus*, whereas others consider each a distinct species.[90] Van Someren [91] considers *poliopterus* specifically distinct from *musicus* but places *metabates* as a race of the latter because, "* * * apparently *M. poliopterus* and *M. metabates* are found in the same countries." Swann [92] doubts the occurrence of both together, but Mearns certainly collected both in the same region. However, it seems more natural to consider *metabates* specifically distinct from *musicus*, and *poliopterus* a race of the latter, rather than the opposite as Van Someren has done. Both *musicus* and *poliopterus* have pure white upper tail coverts, whereas *metabates* has these feathers barred. Of course, it might be argued that the secondaries are a better taxonomic character than the upper tail coverts, in which case Van Someren's treatment would seem more proper, as both *musicus* and *metabates* have these feathers finely vermiculated, and *poliopterus* has them uniform gray. However, I have seen (see next species) *metabates* with practically no vermiculations, and Swann [93] writes that *poliopterus* sometimes shows the freckling on the wings. The upper tail coverts seem to be a more constant character. That all three birds are very closely related is very evident. The forms *neumanni* and *mechowi* are races of *metabates*, as Sclater [94] has correctly designated them.

Besides the actual specimens collected, Mearns noted this goshawk in the following places: Aletta, March 7–13, 1 seen; Abaya Lakes, March 19–26, 6; near Gardula, March 26–29, 2 birds; Gato River, March 29 to May 17, 100; Bodessa and Sagon River, May 18 to June 6, 8 noted; Tertale, June 7, 4 seen; Turturo June 15–17, 4; Anole, June 17, 2 seen; Wobok, June 18, 4 birds; near Saru, June 19, 4 seen;

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[90] See Sclater, Syst. Avium Ethiop., 1924, pp. 71–72.

[91] Nov. Zool., vol. 29, 1922, p. 39.

[92] Monogr. Birds of Prey, pt. 3, 1925, p. 169.

[93] Idem, p. 169.

[94] Syst. Avium Ethiop., 1924, pp. 71–72.

Yebo, June 20, 2 birds; Karsa Barecha, June 21, 4 birds; Malata, June 22, 4; Chaffa villages, June 23–24, 3 seen; Hor, June 26–30, 2 noted; plains at base and south of Endoto Mountains, July 19–24, 4 birds; Er-re-re, July 25, 2; Le-se-dun, July 26, 4; Malele and district immediately to the south, July 27–28, 5 seen; Northern Guaso Nyiro River, July 31, 4 birds; Lekiundu River, August 4–8, 8 seen; Meru, August 9, 2 birds; Tharaka district, August 13, 4; Tana River, August 14, 2 noted.

At Bodessa, Mearns wrote that these goshawks follow the guinea fowl for food, "* * * and are very bold, once returning to the chase immediately after I had shot and wounded a guinea hen, disregarding my presence."

The breeding season in northern Somaliland, according to Erlanger [95] is in January.

MELIERAX METABATES METABATES (Heuglin)

Melierax metabates HEUGLIN, Ibis, 1861, p. 78: White Nile between 6° and 7° N. latitude.

Specimens collected:

Male adult, Adis Abeba, Ethiopia, January 12, 1912.

Male adult, near Gardula, Ethiopia, March 26, 1912.

Seven male adults, Gato River, near Gardula, 4,000 feet (1,200 meters), Ethiopia, April 7–28, 1912.

Male immature, Gato River, near Gardula, Ethiopia, April 24, 1912.

Male nestling, Gato River, near Gardula, Ethiopia, April 21, 1912.

Two female adults, Gato River, near Gardula, Ethiopia, April 14 and 24, 1912.

Male adult, Hoorsah, Ethiopia, no date.

The colors of the soft parts were recorded by Mearns for several of these specimens and his notes indicate considerable variation. Thus, the iris was pale gray in a nestling, pale yellow flecked with brown in an immature male, brown in one and hazel in another adult male, and hazel brown in an adult female. The bill in an immature male was plumbeous black with the tomia and cere olive, in adult males and females it was black or bluish black with the cere and base of the mandible orange. Immature birds have the feet yellow and the claws black; adults have orange feet and black claws. According to Gyldenstolpe [96] adults have the legs and cere coral red, the lower mandible orange red.

One of the males collected near Gardula had just killed a francolin and was feeding on it.

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[95] Journ. f. Ornith., 1904, p. 165.

[96] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 285.

For reasons given under the preceding species, *metabates* is considered specifically distinct from *musicus* of which *poliopterus* is a race.

The species *metabates* is said to have four races as follows:

1. *M. m. metabates.*—The range is usually considered to extend from northeastern Africa to southern Sudan, Ethiopia, and southern Arabia (Yemen); and Northern Nigeria. This is substantially the range as given by Swann[97] and Sclater.[98] However, Van Someren[99] records this bird from Turkana district, Uganda, and Loveridge collected specimens (now in the Museum of Comparative Zoölogy) at Eldoret, Kenya Colony, and at the following localities in Tanganyika Territory—Mwadira and Nyambita (both near Mwanza); Ulugu, Usshoro; and Ndala (near Tabora). The range is therefore more extensive than mentioned above, and goes south to central Tanganyika Territory.

2. *M. m. neumanni.*—Of this race I have seen but one specimen; according to Swann (see above) it is lighter than typical *metabates;* the vermiculations of the wing coverts and secondaries are sometimes developed into bars; the upper tail coverts less barred; it inhabits the arid regions of the southern Sahara and south Saharan savannas from Lake Chad to Kordofan, and Nubia, Ethiopia, Hausaland, and the Red Sea Province of the Sudan. The specimen examined is from Ethiopia. (See next species.)

3. *M. m. mechowi.*—Said to be darker above and below than *metabates.* This race I have not seen and therefore can not form any opinion on it. However, I have seen some rather dark eastern birds (*metabates*) which almost fit the description of this race. The range is said to be from southern Angola and northern Damaraland, east to Nyasaland and Mashonaland.

4. *M. m. ignoscens.*—Like *metabates* but smaller; southwest Arabia; seven specimens seen.

A series of 30 specimens of *metabates* assembled for this study illustrates the various plumages of this hawk. The nestling collected by Mearns on the Gato River, Ethiopia, is partly in juvenal plumage, partly still covered with natal down. The down is a pale dirty white with a faint suggestion of very pale gray brown. The incompleteness of the juvenal plumage indicates that the last regions of the body to be molted are the lower back, sides, flanks, and sides of the throat. The breast and center of the throat have the new feathers only slightly developed, those of the throat less so than the breasts. The forehead and a stripe down the center of the head are likewise clothed only with down, no pennaceous feathers having grown in as yet. Judging by the relative development of the juvenal feathers, it seems that the wings, tail, and interscapulars are the first to grow in, in approximately the order named. The upper parts are darker in immature males than in females of corresponding age. In juvenal birds the rectrices vary considerably. Usually they are all banded, the light areas of the outer ones becoming darker and browner centripetally, but even the middle pair are distinctly banded. One bird, however, (M.C.Z. 133210, Ndala, near Tabora, Tanganyika Territory, A. Loveridge coll.) has the middle pair fuscous black, entirely unbanded.

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[97] Synopsis of Accipitres, 1922, p. 30.

[98] Syst. Avium Ethiop., 1924, p. 72.

[99] Nov. Zool., vol. 29, 1922, p. 39.

The order in which the juvenal feathers are shed and replaced by those of the adult plumage is quite different from that in which they were first acquired. The post-juvenal molt begins in a rather indefinite way, a few new, black-banded feathers on the thighs, and upper tail coverts being the first indication of ecdysis. The molt then spreads irregularly over the thighs, flanks, sides, abdomen, and breast, involving only a few feathers in any one place. About this time a few new feathers appear on the occiput and nape, then the innermost primaries are shed. The molt then proceeds rapidly on the top of the head, leaving a median stripe of juvenal feathers unaffected. Upper wing coverts, scapulars, and a few rump feathers begin to molt sporadically, and then all the body feathers begin to molt rapidly and then the secondaries and the rectrices. When the bird has practically assumed adult appearance the outer juvenal primaries are replaced, thereby completing the molt. The adult primaries are usually uniform fuscous, but not infrequently one finds birds with these feathers more or less freckled or mottled with grayish or grayish white. Birds in the southern Saharan region have this freckling carried to the extreme, where the light spots are more or less concentrated, giving the appearance of indefinite bars, suggesting in some ways the primaries of the juvenal plumage. This is the race *neumanni*. The secondaries, when fresh, are terminally margined with white, but the white edges wear off, and their presence or absence seems to be a fairly reliable guide as to the age of the plumage.

Birds in first adult plumage usually have quite a number of brownish juvenal feathers on the back and interscapulars, mixed among the slaty-blue-gray adult ones, and may be told in this way from older individuals.

Zedlitz[1] writes that he finds two very different types of immature brown plumages in this bird, one much darker than the other, and concludes that the darker is the real juvenal plumage and the lighter an immature plumage acquired at the post-juvenal molt, and replaced in turn by the first adult plumage. He feels that the first gray adult plumage is not assumed until the second or third year. I rather doubt that there are two brown plumages—a dark juvenal and lighter immature, but suspect that Zedlitz was comparing young birds of opposite sex. I have seen dark juvenal males in which a few dark grayish (adult type) feathers were sprouting.

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[1] Journ. f. Ornith., 1910, pp. 367–369.

As mentioned under the preceding species, the wing coverts and secondaries of *metabates* are usually, but not always, vermiculated or freckled with white or grayish white. This variation is correlated with sex, but not with age, season, wear, or locality. Males have far more of the white marks than have the females. It is possible to pick out males from a series merely by the whiter appearance of the folded wings. I suspect that this may in part account for Zedlitz's mention of two types of adult plumage, one darker than the other.[2] Still, even among females about one bird in ten has practically no vermiculations, but the lightness and abundance of these markings in the rest is by no means uniform. Every gradation occurs from none at all to such abundance of freckles that the folded wings look almost like those of male birds.

The size variations of typical *metabates* may be judged from the following figures.

Locality	Sex	Wing	Tail	Culmen
Eritrea, Aileb	♂ adult	305	216.0	19.0
Arabia:				
Sheik Othman	do	290	206.0	18.5
Do	do	285	208.0	18.5
Lahej	do	283	201.0	18.8
Sheik Othman	do	278	198.5	19.0
Ethiopia:				
Gato River	do	298	211.0	19.5
Do	do	317	220.0	19.0
Do	do	305	213.0	19.0
Do	do	316	218.0	19.0
Do	do	304	208.0	19.5
Do	do	312	215.0	19.5
Near Gardula	do	310	214.0	20.0
Adis Abeba	do	308	214.0	19.5
Tanganyika Territory	do	314	223.0	21.0
Arabia:				
Lahej	♀ adult	304	209.0	20.0
Sheik Othman	do	305	211.0	21.0
Sudan:				
Blue Nile, Singa	do	322	230.0	21.0
Dinder River	do	320	219.0	22.0
Ethiopia:				
Gato River	do	336	236.0	22.0
Do	do	329	228.0	21.5
Kenya Colony, Victoria Nyanza	do	315	217.0	20.5
Tanganyika Territory, Mwadira	do	305	-------	19.0

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[2] Journ. f. Ornith., 1910, pp. 367–369.

MELIERAX METABATES NEUMANNI Hartert

Melierax canorus neumanni Hartert, Vög. pal. Fauna, vol. 2, p. 1165, 1914: Dongola Province, Sudan.

Specimens collected:

Male adult, Gato River, near Gardula (4,000 feet (1,200 meters) altitude), Ethiopia, April 29, 1912.

The single specimen collected agrees with the characters of this race and constitutes the first record for *neumanni* in Ethiopia, and considerably extends the known range of the race. It undoubtedly is merely a stray wanderer in Ethiopia, as the preceding form, *metabates*, is the breeding bird of that region.

This specimen is rather small, agreeing with the minimum measurements given by Swann.[3] It has a wing length of 300 millimeters; tail, 210 millimeters, culmen (from cere), 20 millimeters. It is in the first adult plumage, as is indicated by the presence of some brownish feathers among the slate-gray ones on the back.

MELIERAX GABAR (Daudin)

Falco gabar Daudin, Traité, vol. 2, p. 87, 1800: interior of South Africa (from Levaillant).

Specimens collected:

Male and female adults, Sadi Malka, Ethiopia, January 27, 1912.
Male adult, Hawash River, Ethiopia, February 10, 1912.
Male adult, Gato River near Gardula, Ethiopia, April 19, 1912.
Male adult, Tertale, Ethiopia, June 11, 1912.
Male adult, Turturo, Ethiopia, June 15, 1912.
Female, immature, Yebo, Ethiopia, June 21, 1912.
Female, immature, Chaffa (upper village), Ethiopia, June 25, 1912.
Male and female, immature, 24 miles south of Malele, Kenya Colony, July 29, 1912.
Female, immature, Lekiundu River, Kenya Colony, August 4, 1912.

The male from Turturo is of the black phase (*niger*).

Mearns recorded the following facts about the colors of the soft parts: An immature female had the cere and bill black, the gape margined with yellowish; an adult male had the tip of the bill black, the base of the bill and the cere orange; the melanistic specimen had the bill and cere all black. The feet were orange yellow in the immature female, orange in the adult male, and yellow blotched with black in the melanistic bird. The color of the iris was recorded only for the black specimen, in which it was hazel brown.

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[3] Synopsis of Accipitres, 1922, p. 30.

Mouritz[4] records it as orange yellow, while still others write that the iris is red or red brown.

In a series of six examples of the black phase the color of the tarsus varies from yellowish orange to black. Intermediates have some of the scutes black and others yellowish, but none have the scales actually intermediate in color.

This hawk has been considered to have two races, the southern one being the typical form, the northern (*niger*) said to be larger and paler. Swann[5] has given the ranges of these two and also the size limits of each form. Sclater[6] does not recognize *niger*. I have examined a series of 30 specimens from Ethiopia, southwest Arabia, Sudan, Kenya Colony, Tanganyika Territory, and South Africa, and am unable to support Swann's contention as to the validity of the two races. According to this writer the southern birds have wings measuring from 176–190 in the male, and from 190–204 millimeters in the female. The northern birds are said to have the following wing measurements; male, 190–195 (one 203); female, 205–212 millimeters. However, I find that an adult female from South Africa has a wing 209 millimeters in length while a comparable specimen from the White Nile (identified by Swann as *niger*) has a wing of only 200 millimeters. Birds from the same locality vary considerably in size, and, on the whole, it seems that slight size differences mean very little in this species. It is rather curious, however, to find that melanistic specimens are usually somewhat (occasionally considerably) smaller than normal birds of the same sex from the same locality. Thus, a black male from Morogoro, Tanganyika Territory, has a wing 182 millimeters long; tail, 155; culmen from cere 13.0 millimeters, while a normal male from the same place has the following measurements: Wing, 190; tail, 169; culmen, 13.5 millimeters. A black female from South Africa measures as follows: Wing, 198; tail, 165; culmen, 14.5 millimeters; while a normal one from the same country has a wing 209 millimeters long; tail, 164; culmen, 14.5 millimeters.

Aside from size differences, the northern form *niger* is said to be paler than typical *gabar*. This I am likewise unable to uphold. There certainly is considerable variation in the color of the back and upper parts generally, and of the breast as well, but such differences in shade as occur are not geographical, but merely individual, and possibly due to age.

Immature birds show greater color variations than do adults. As a rule, the upper tail coverts are more nearly pure white in young males than in young females. Every immature bird of the latter sex examined (5) has each of these feathers subterminally banded with brown, and most of them with at least one more basal band as well, while of three young males examined, two have these coverts pure white, and the third has a small subterminal brown spot on each one.

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[4] Ibis, 1915, p. 200.

[5] Idem, 1923, p. 610.

[6] Syst. Avium Ethiop., 1924, p. 72.

The throat streaks in young birds vary from light rufous tan to dark brown or earth brown. Swann[7] writes that in this plumage the throat and breast are rufous with very distinct central streaks of dark brown. Of eight immature birds examined, only one fits this description—a young female from Dinder River, Sudan. All the others have the throat and breast distinctly white, the feathers with broad, brown median streaks and wide white margins. The brown streaks are narrowest in a male from Tanganyika Territory, and widest and darkest in one from Fazogli, Blue Nile, Sudan. The Dinder River specimen not only differs from all the others in having the throat and breast brown, but also in having the bars on the rest of the underparts wider, and more reddish. The feathers of the upper parts in all the specimens are edged with rufous cinnamon, but in a few cases the feathers of the top of the head and the lateral margins of the nape are edged with whitish instead. The white tips of the secondaries vary a great deal. This is not to be accounted for by wear, as the specimen with the most white has the cinnamon edges of the feathers of the back almost completely worn away, while in other birds where these margins are still present, the amount of white on the secondaries is much less.

Unlike the large species of *Melierax*, *gabar* does not acquire uniform unbarred remiges in the adult plumage, but the number of cross bars in adult remiges is just as great as in young birds. It is materially reduced, however, in birds of the black phase.

Adult birds usually have the upper tail coverts pure white, but occasionally specimens are found with brownish bars or spots. Swann[8] writes that a bird from Aden, Arabia, differs from African specimens in having the underparts more strongly barred, and in having black bands on the upper tail coverts. This specimen (together with the rest of the Swann collection) is now in the Museum of Comparative Zoölogy where I have examined it. I find that the female collected by Mearns at Sadi Malka matches it very closely except in size. It seems that heavier markings would be a very natural occurrence in a species that so frequently produces melanistic individuals.

This hawk is found in the lower parts of Ethiopia (not over about 5,000 feet, or 1,500 meters) and is therefore absent in large parts of Arussi-Gallaland and central Ethiopia. Its main strong-hold in northeastern Africa seems to be southern Gallaland, the eastern part of the Hawash valley, and southern Somaliland. Erlanger [9] writes that he never saw this species in the highlands, but met with it in the southern Shoan Lakes district, and found it an abundant bird in the Acacia savannas of Somaliland and southern Gallaland. He records collecting a female in breeding condition on April 6 in Gurraland. Heuglin found this bird common in the cultivated lands of the Nile valley in Nubia and Sennar and observed the breeding season there to be in July and August.

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[7] Monogr. of Birds of Prey, pt. 3, 1925, pp. 172–175.

[8] Ibis, 1923, p. 607.

Mearns observed this bird in several localities where he did not collect any—Indunumara Mountains, July 14–18, 2 birds seen; plains at base and south of Endoto Mountains, July 21–24, 1 noted; Athi River, August 31, 2 birds seen.

CIRCUS MACROURUS (Gmelin)

Accipiter macrourus S. G. GMELIN, N. Comm. Acad. Petrop., vol. 15, p. 439, pls. 8 and 9, 1771: Veronetz Gouv. to the Volga.

Specimens collected:

Male adult, Adis Abeba, Ethiopia, December 31, 1911.

Immature, Arussi Plateau (10,000 feet, 3,000 meters), Ethiopia, February 27, 1912.

Female adult, Gidabo River, Ethiopia, March 15, 1912.

The colors of the soft parts of the adult female were recorded as follows: Iris, brown; bill, black, greenish yellow on base of mandible and sides of maxilla at base; feet, yellow; claws, black.

The unsexed immature bird probably was a female, as it is rather large (wing 373 millimeters). With the material at hand (8 adult males, 4 adult females, and 7 young birds) I can not differentiate a juvenal and an immature plumage as Hartert has done.[10] All seven young birds examined seem to agree with what he refers to as the immature plumage. The one young specimen collected by Mearns differs from the four others from Palestine in that it has the cere darker (in dried skin), more blackish, while the four from Palestine have the cere distinctly yellowish in color. A young bird from Kenya Colony, and another from Tanganyika Territory agree with the Abyssinian specimen. This difference in the color of the cere does not hold for adult birds, although Palestinian specimens have the cere yellower on the average than African birds.

The color of the throat varies considerably in these seven immature birds. In some it is almost uniform pale buffy, the somewhat darker and grayer shaft streaks not extending beyond the proximal two-thirds of the feathers, and consequently not showing. In others the shaft streaks are dark earth brown and extend to the tips of the feathers, giving the throat a heavily streaked appearance. The upper tail coverts also vary, but to a lesser extent. In some individuals they are pure white; in others subterminally spotted with dull earth brown.

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[9] Journ. f. Ornith., 1904, p. 179.

[10] Vög. Paläarktischen Fauna, vol. 2, p. 1142.

The adult female agrees fairly well with another from Dinder River, Sudan, but is slightly redder below. Both have a whitish, indefinite band on the nape, which connects with the whitish bands forming the posterior margin of the facial disk. The Sudanese bird has the chin and upper throat white, continuous with the disk margins, but the Abyssinian bird has the chin and upper throat pale tawny. Both differ from a female from Bumba, Belgian Congo, in that the latter lacks the white band on the nape, has the bands demarkating the facial disk light buffy, not white, and has the sides of the face darker brown than in either of the former. The Congo bird is slightly darker than the Abyssinian one, especially on the underparts.

In the adult males, the only color character that varies considerably is the extent of the black area on the inner web of the next to the outermost primary. In some it does not extend proximally as far as the tip of the outermost primary; in others, far beyond it.

The spring migration dates of this hawk in Ethiopia and Somaliland are from January to February; the fall migration, from October to November.

GYMNOGENYS TYPICUS TYPICUS (Smith)

Polyboroides typicus A. Smith, S. Afr. Quart. Journ., ser. 1, p. 107, 1830: Eastern Cape Province.

Specimens collected:

Female adult, Alaltu, Ethiopia, January 17, 1912.
Female adult, Anole Village, Ethiopia, May 18, 1912.

Mearns made the following notes regarding the colors of the soft parts. "Side of face (bare skin), deep yellow; cere and base of bill, all around, fleshy white; bill black; feet yellow, claws black." An interesting note was made to the effect that the heel joint works both ways in this hawk.

Both birds collected were molting the remiges at the time. The bird from Alaltu still has the old, immature, four outermost primaries in the left wing and the three outermost ones in the right wing, while the specimen from Anole Village still has the old two outermost primaries in the left wing and the outermost one in the right wing. It also has several brownish secondaries. It is rather curious that the molt should be more advanced in the right wing than in the left and just to the extent of a single remex in each case. The fact that the Anole specimen also has several (5) old secondaries, whereas the other individual has molted and replaced all the secondaries, indicates more or less irregularity in the time and order of molt of these feathers. The tail molt is also somewhat irregular, but not enough data are available on this point. In some individuals it seems to be centrifugal; in others centripetal.

The plumages of this hawk have been studied rather carefully by Erlanger[11] and the following notes are in a sense supplementary to his.

Young birds show an enormous amount of variation in color. The juvenal plumage is represented in the material examined by a specimen of *pectoralis* from Buta, Lower Uelle River, Belgian Congo. It is uniformly dull, dark chocolate brown above and below, the feathers of the upper parts terminally edged with paler brown; the primaries are fuscous, basally washed with whitish on the inner webs and the whitish areas obscurely marked and broadly barred with fuscous; the outermost primary unbarred in its darker portion (distal two-thirds), the next one indistinctly banded with four bars, the bars becoming more distinct on the next and more proximal remiges; the secondaries are dull chocolate brown, the outer ones faintly banded with darker; the rectrices are like the back but are banded with four narrow fuscous bands which are darkest on the middle tail feathers and become lighter on the outer ones; the under wing coverts are dull chocolate brown.

The variations in seven other young birds are so great that it is quite hopeless to make any logical arrangement which accounts for all the plumages. The tail feathers seem to be the most reliable criterion and they indicate that the adult plumage is not assumed until at least the third, and possibly the fourth year. In the juvenal plumage the rectrices are as described above, dull chocolate brown narrowly banded with fuscous. In the youngest bird examined these bands are four in number and the first and last are neither basal nor apical. In an immature male from Avakubi, Belgian Congo (J. P. Chapin coll.) the first band is basal, the last subterminal, being apically bordered with whitish, and only one intermediate band is present. The basal band is very broad in the middle rectrices. This specimen has some older tail feathers which are similar to those in the true juvenal described above. This may represent the first " winter " plumage. The bird resembles the juvenal one in the color of the upper parts except the head, which is different in that the forehead and anterior half of the crown are pure whitish slightly tinged with pale buff. The underparts are lighter and less uniform than in the juvenal plumage; the chin and throat are pale buffy streaked with blackish brown; the breast and abdomen are darker brown, the former streaked with terminally lanceolate shaft streaks of blackish brown, the latter pale rufous brown barred with darker rufous brown and tipped with sandy tawny; the flanks very light, pale tawny broadly barred with dull chocolate brown; thighs light tawny narrowly barred with brown; under tail coverts like the thighs but broadly barred with pale rufous brown; under wing coverts largely whitish or buffy white marked with brown.

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[11] Journ. f. Ornith., 1904, pp. 157–160.

However, all birds, apparently of this age, are not like this one. Thus, a young bird from Gaboon (Mus. Comp. Zoöl. 33128) is much lighter below, except that the streaks on the throat and breast are blacker, and, instead of being merely shaft streaks, comprise the entire distal halves of the feathers. The upper parts are much blacker also, particularly the hind crown, occiput, nape, and interscapulars. The tail is of the juvenal type.

The next plumage is characterized by lighter underparts and by very broadly barred rectrices (bars about 1.5 inches or more in width). The lighter bars on the tail feathers are brownish gray, not gray as in the adults. These birds vary enormously: Some are heavily barred on the abdomen, others very slightly so; some have the thighs barred, others unbarred. The oldest immature bird (male, Avakubi, Belgian Congo, J. P. Chapin coll. A.M.N.H. 157760) has the entire chin, throat, and breast pure pale tawny buff with no dark markings at all. The thighs are almost unbarred as well.

Apparently the appearance of narrow bars on the flanks and thighs is not necessarily a sign of approaching maturity, as one bird in the first postjuvenal plumage has such markings while older birds do not.

The systematics of this hawk have been studied most recently by Swann, who recognizes four races.[12] Inasmuch as I have not sufficient material to judge of all of them, the following notes are necessarily brief.

According to Swann the four races are as follows:

1. *G. t. typicus.*—South, east, and northeast Africa.

2. *G. t. pectoralis.*—Tropical West Africa. Cameroon to Nigeria (?); said to be smaller than *typicus*, wing (female) 405 millimeters, more heavily barred with black, the black bars nearly equal to the white ones.

3. *G. t. kempi.*—Sierra Leone; much smaller than *typicus*, wing (male) 360, (female) 392 millimeters; paler generally than *typicus*, the white edges on the wings and the white ventral bars broader.

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[12] Monog. Birds of Prey, pt. 2, pp. 97–101.

4. *G. t. graueri.*—Belgian Congo and Uganda; smaller and darker than *typicus*, wing (female) 445–450; more heavily barred than any of the first three forms, the black bars broader than the white ones.

Hartert[13] definitely relegates *graueri* to the synonymy of *typicus*, and while he does not actually mention or in any way refer to *kempi*, he says that he can only distinguish the Madagascan *radiatus* (which he considers conspecific with *typicus*), and two African forms, *typicus* and *pectoralis*. However, I have seen a female from Gbanga, Liberia (G. M. Allen coll.) now in the Museum of Comparative Zoölogy which agrees with the description of *kempi*. It has a wing length of 398 millimeters. On the other hand, a female *pectoralis* from Cameroon has wings 424 millimeters long.

The Anole specimen was shot under rather peculiar circumstances. To quote from Mearns' notes, "* * * a *Polyboroides* was perched on a mass of 'squeaky' weavers (*Textor* sp.) nests. The weavers assembled in force and made a terrible fuss until I shot the *Polyboroides*. Its joints work both ways which enables it to hang from tree trunks and branches. Its stomach was empty. I shot another, but it dropped in high weeds and 'quendoed' (that is, got away)."

Family FALCONIDAE

FALCO BIARMICUS ABYSSINICUS Neumann

Falco biarmicus abyssinicus Neumann, Journ. f. Ornith., 1904, p. 369: Turrabolonko, Kollu, Shoa.

Specimens collected:

Male immature, Adis Abeba, Ethiopia, January 9, 1912.

The above specimen is very light in color and has practically no reddish tinge on the crown. Although labeled as a male, the specimen is probably a female as it is very large, almost as large as the largest female of the series in the Museum of Comparative Zoölogy. Its measurements are as follows: Wing, 398; tail, 225; culmen, 24.5 millimeters, while the largest female presents the following figures: Wing, 411; tail, 241; culmen, 24 millimeters (but tip shot off). It should be noted that the largest measurements recorded for this hawk are considerably under the present two. Neumann[14] gives 385 millimeters as the wing length of the largest female he examined; Hartert[15] records none longer than 375 millimeters; and Swann[16] gives the wing length as follows: Male, 326–344 and female 362–375 millimeters. Other birds in the series in the Museum of Comparative Zoölogy agree with the limits set by Swann.

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[13] Nov. Zool., vol. 34, 1928, p. 238.

[14] Journ. f. Ornith. 1904, p. 369.

[15] Vögel der Paläarktischen Fauna, vol. 2, p. 1057.

[16] Synopsis of the Accipitres, ed. 2, 1922, p. 204.

Sclater[17] gives the range of this race as extending, "* * * south to Uganda and the Great Lakes," while the typical form ranges from South Africa north to Kitui, Kenya Colony. A juvenal male from Luchenza, Nyasaland, formerly in the collection of H. Kirke Swann, now in the Museum of Comparative Zoölogy, is extremely dark above and agrees perfectly with Hartert's[18] diagnosis of the juvenal plumage of *abyssinicus*. The specimen was identified as *abyssinicus* by Swann, but was apparently not made use of in his account of the distribution of the races of the lanner falcon. It is slightly questionable if this individual is really *abyssinicus*, separated as it is from the range of that race by some 1,200 miles, and not merely an aberrant individual of typical *biarmicus*.

When reidentifying the hawks in the Museum of Comparative Zoölogy, James L. Peters brought the following facts to my attention. One of the so-called races of *Falco biarmicus*, the form *feldeggii*, seems to be worthy of specific distinction. The cere in *feldeggii* is narrower than in any of the races of *biarmicus*, the feathers of the lores extend beyond the margin of the nostrils, and the tail is proportionately longer, more like that in *Hierofalco*. I have personally reexamined all the available material and my findings agree fully with those of Mr. Peters.

The species *biarmicus* is entirely African and Arabian (including Palestine) in distribution, and contains the following four races:

1. *F. b. biarmicus*.—Africa from the Cape of Good Hope north to Angola and Kenya Colony.
2. *F. b. tanypterus*.—Arabia, Palestine, Egypt, Nubia, south to the Anglo-Egyptian Sudan (Khartoum).
3. *F. b. abyssinicus*.—Ethiopia, Shoa, Gallaland, Eritrea, southwestern Arabia (Aden Protectorate), west to Nigeria, south to the lakes of central Africa, possibly to Nyasaland.
4. *F. b. erlangeri*.—Africa north of the Sahara from Tunis to Morocco.

FALCO TINNUNCULUS TINNUNCULUS Linnaeus

Falco tinnunculus LINNAEUS, Syst. Nat., ed. 10, vol. 1, p. 90, 1758: Europe; restricted type locality, Sweden *apud* Hartert.

Specimens collected:

Male, Arussi Plateau, Ethiopia, February 20, 1912.
Female, east of Saleish, Ethiopia, January 12, 1912.
Female, Arussi Plateau, Ethiopia, February 29, 1912.

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[17] Systema Avium Ethiop., 1924, p. 51.

[18] Vögel der Paläarktischen Fauna, vol. 2, p. 1057.

The birds taken on the Arussi Plateau were shot in a patch of juniper woods at an elevation of 9,000 feet (2,700 meters) above the sea. The male is not fully adult and has the top of the head and nape more or less washed with pale tawny, especially the head, some of the feathers of which part are bluish gray only medially and have broad tawny edges, while others are almost entirely brownish. The tail feathers are tawny chestnut, suffused with bluish gray for their basal three-fifths; the upper tail coverts and rump are chiefly bluish gray but still retain some barred rufous tawny feathers.

A long series of specimens of the races of this species in the United States National Museum and the Museum of Comparative Zoölogy indicates that the intensity of the coloration of both the upper and the underparts varies not only with sex, age, season, and wear, but individually as well to an extent that leads me to feel that the Egyptian race *rupicolaeformis* Brehm is probably not distinguishable from typical *tinnunculus*. Swann's Arabian series of *rupicolaeformis* (collected in the Aden Protectorate by Meinertzhagen) are certainly not different from European birds, which latter no one would say were other than typical *tinnunculus*.

For that matter, all the races of this kestrel are based on average differences, and are therefore not always identifiable when only a few specimens are available. However, the series at hand is extensive, and I can recognize the following subspecies: *tinnunculus*, *canariensis*, *dacotiae*, *japonicus*, *interstinctus*, *neglectus*, *carlo*, and *rupicolus*. The South African *rupicolus* seems almost worthy of specific rank. A specimen of *carlo* from Ethiopia is small enough to fit the characters of *neglectus* to which form it certainly does not belong. *F. t. neglectus* is small, dull, dark, and barred in both sexes, and is therefore obviously different from *carlo*. The form *dorriesi* was rejected by Meinertzhagen[19] after a study of Siberian specimens. Two specimens (from the Swann coll.) from Wad Medina, Blue Nile, attributed to *dorriesi* are typical *tinnunculus*. It is true that they have tails of more than average length, but the difference is too slight to be worthy of nomenclatural recognition. These two specimens are no paler than many European and African examples of *tinnunculus*.

Although the European kestrel was known to migrate to Africa as far south as central Tanganyika Territory, it had not previously been found high up in the Ethiopian highlands where *carlo* is the resident form. The specimens from the Arussi Plateau indicate that the species migrates not only along the Nile Valley and the Red Sea coast, but over the lofty inland plateau of Ethiopia as well.

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[19] Ibis, 1922, pp. 60–61.

Some specimens of *tinnunculus* are very similar to *F. naumanni* but may be identified in any plumage by the color of the claws which are blackish in the former and light yellow in the latter. The difference is distinct even in old skins.

FALCO TINNUNCULUS CARLO (Hartert and Neumann)

Cerchneis tinnunculus carlo Hartert and Neumann, Journ. f. Ornith., 1907, p. 592: Bissidimo, near Harrar.

Specimens collected:

Female, Adis Abeba, Ethiopia, January 2, 1912.
Male, Sirre, Ethiopia, February 13, 1912.

The female is unusually small, having the following measurements: Wing, 218; tail, 149.5; culmen, 15; tarsus, 35 millimeters. It is also much lighter in color above than the male, and has the streaks on the underparts much narrower and lighter, less blackish, more brownish. The ground color of the underparts is, however, slightly darker, less whitish, more tawny, in the female than in the male.

This race of the kestrel inhabits the edges of forested districts of tropical Africa from Ethiopia south to central Tanganyika Territory in the east and, according to Sclater,[20] from Nigeria to Angola in the west. An adult bird in the Museum of Comparative Zoölogy from Mkangazi, in the Uluguru Mountains, Tanganyika Territory (A. Loveridge coll.), is unquestionably *carlo*, while another from Morogoro, near the base of the Uluguru Mountains, is slightly intermediate between *carlo* and the southern form *rupicolus*. Inasmuch as forest areas in eastern Africa are practically restricted to mountains, the present bird is a highland bird exclusively in the eastern part of its range. In view of the discontinuity of elevated land masses in eastern Africa it is somewhat surprising to find the highland birds constant in their racial characters throughout such an enormous distance, a matter of some 1,300 miles, and yet intergrading at the bases of their hilly outposts with the lowland form that more or less completely surrounds them.

Kestrels, probably of this form, were observed at Aletta, March 7–13, 10 birds; Loco, Gidabo River, March 13–17, 10 seen; Abaya Lake, March 18–26, 16 noted; near Gardula, March 26–29, 2 birds; Athi River, September 1–2, 2 noted.

FALCO ARDOSIACEUS Bonnaterre and Vieillot

Falco ardosiaceus Bonnaterre and Vieillot, Encycl. Méth. Orn., pt. 3, p. 1238, 1823: Senegal.

Specimens collected:

Male, Gato River, near Gardula, Ethiopia, April 12, 1912.

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[20] Systema Avium Ethiopicarum, 1924, p. 54.

The specimen listed above is darker than other males from Mwanza and from Ukerewe Island, southern Victoria Nyanza. It has the crown and occiput darker than any individual of either sex in the series examined. The description of the male given by Swann [21] is not correct in that he says the throat and sides of the face are whitish. I have seen no specimen with whitish sides of the face and only one in which the upper throat and chin are whitish—the Mwanza bird (Museum Comparative Zoölogy 133155). The sides of the face in all specimens seen are slaty gray with dark shaft streaks in the feathers.

The following measurements indicate the size variations of this species:

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia, Gato River	♂	229. 0	151	16. 5	38. 0
Lake Victoria, Ukerewe Island	♂	225. 5	144	17. 7	43. 5
Tanganyika Territory, Kome, Mwanza	♂	227. 0	147	17. 0	41. 5
Gambia, Wellingara	------	229. 5	150	17. 3	46. 5
Tanganyika Territory, Kome, Mwanza	♀	254. 0	163	19. 0	44. 0

The range of this species is given by Swann [22] as from Uganda to Egypt, Sudan, and Ethiopia in eastern Africa. Sclater [23] gives a similar statement of distribution. The range should be extended southward to Tanganyika Territory at least as far as the southern tip of Lake Victoria (Kome, Mwanza—2 specimens).

This species, together with *dickinsoni* Sclater, and *zoniventris* Peters, are often placed in a genus unto themselves—*Dissodectes* Sclater, characterized by a double-toothed mandible, and wing with the third primary longest. None of the specimens of the three species examined has more than a single tooth on the maxillary tomium, and while the third primary is actually the longest, the difference between it and the second is very small, certainly as small as the difference in the opposite direction in the Cerchneine falcons. *Dissodectes* may stand as a subgenus but certainly not as a genus. It is really nothing but a small aggregate of gray-plumaged species of the subgenus *Cerchneis.*

POLIHIERAX SEMITORQUATUS CASTANONOTUS (Heuglin)

Hypotriorchis castanonotus Heuglin, Ibis, 1860, p. 407: Mêré Belenia—*i. e.,* near Gondokoro, Upper White Nile.

Specimens collected:

Male, Ourso, Ethiopia, September 13, 1911.

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[21] Synopsis of the Accipitres, 1922, p. 230.

[22] Idem, p. 230.

[23] Syst. Avium Ethiop., 1924, p. 55.

Male, Ourso, Ethiopia, October 15, 1911.

Three females and two males, Dire Daoua, Ethiopia, November 2 to December 17, 1911.

Male and female, Guaso Nyiro River, Kenya Colony, August 1–2, 1912.

The colors of the soft parts are recorded for an adult female (from Guaso Nyiro River) as follows: Feet orange; claws black; cere and orbit vinous red; bill blue with black tip.

Our knowledge of the races of the African pygmy falcon is rather unsatisfactory in that while most authorities agree in recognizing but two forms—*semitorquatus* and *castanonotus*, the latter seems but slightly more valid than *deckeni*, which is usually regarded as unrecognizable. It may be that *deckeni* seems more valid to me than to other writers because I have seen but three specimens from Somaliland, all of which happen to fit the description. However, I feel that the species *Polihierax semitorquatus* does not vary enough geographically to warrant the recognition of many local forms. According to Swann[24] and Sclater,[25] *castanonotus* ranges south to Kenya Colony, Uganda, and Tanganyika Territory, while *semitorquatus* does not occur north of Damaraland, Bechuanaland, the Orange Free State, and Basutoland. On the other hand, Van Someren[26] writes that *semitorquatus* ranges north to Kenya Colony (Athi River).

In the Museum of Comparative Zoölogy there is a specimen, undoubtedly of the typical race, from Mwanza, Tanganyika Territory, indicating that the characters of that race may appear far to the north in equatorial Africa. This specimen is large even for typical *semitorquatus*, and is in no sense an intermediate.

The race which Oberholser described and named *homopterus* is recognized, among recent writers, only by Zedlitz. On geographic grounds the Abyssinian specimens in the present collection should belong to this race, if it were valid. Zedlitz records a male specimen[27] from Dire Daoua with a wing length of 122 millimeters (a slight excess over either of the two birds in the Frick collection), and eight other males from Ethiopia with wings of from 116–123 millimeters.

These limits of size variation lie wholly within those of *castanonotus* (in which the wing varies from 116–124 millimeters). On the other hand, Van Someren[28] gives the wing variation of his series of male *homopterus*, as 110–115 millimeters. In this case the limits are included in those given by Zedlitz for his race *deckeni*. The typical, southern race is supposed to have wings of from 124–131 millimeters, yet the two South African birds examined have wings of 119 and 122 millimeters, respectively (and they are both females and should therefore be at the higher rather than the lower size limit). Appended is a table of measurements of all the material examined. It seems to indicate that size has no constant geographical significance in this falcon and it necessarily follows that races based on size characters can not be maintained.

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[24] Synopsis of the Accipitres, 1922, p. 183.

[25] Syst. Avium Ethiop., 1924, p. 56.

[26] Nov. Zool., vol. 29, 1922, p. 44.

[27] Journ. für Ornith., 1914, p. 676.

[28] Nov. Zool., vol. 29, 1922, p. 44.

Locality	Sex	Wing	Tail	Culmen
Ethiopia:				
Ourso	♂	121.0	76.5	10.5
Do	♂	116.0	76.5	10.0
Dire Daoua	♂	118.0	76.0	10.5
Do	♂	119.0	80.5	10.5
Kenya Colony, Guaso Nyiro River	♂	119.0	75.0	10.5
Do	♀	124.0	76.0	11.5
Tanganyika Territory, Mwanza	♀	128.0	80.0	12.0
Ethiopia, Dire Daoua	♀	119.0	75.0	11.5
Do	♀	120.0	75.5	-------
Do	♀	118.0	72.0	11.5
British Somaliland	♀	116.5	70.0	10.5
Northern Somaliland, Burao	♀	112.0	71.5	10.0
Somaliland, Goulf	♀	119.0	70.0	10.2
South Africa, Transvaal, Maquassi	♀	119.0	74.5	10.5
Do	♀	122.0	71.0	11.0
Kenya Colony:				
Barsaloi	♀	116.0	73.0	11.0
Do	♀	116.0	76.0	11.5
Do	♂	112.0	77.0	11.0
Tana Kenna	♂	114.0	76.0	11.0
Waso	♂	112.0	75.5	10.5
Kenna River	♂	116.0	75.5	10.5
Teita Hills	♂	126.0	75.0	11.5
Marsabit Road	♂	113.0	72.0	11.5

It may be noted at this point that Reichenow[29] gives the wing measurements of the male of this species as 210–228 millimeters, obviously a misprint, intended to read 110–128 millimeters.

The races *semitorquatus* and *castanonotus* meet in Kenya Colony. The latter is smaller than the former, but seems to increase in size (average) as it goes north, approximating the size of *homopterus*. The difficulty with *homopterus* and *deckeni* seems to be that long series are not available, but judging from their respective limits of size variation it appears as though sufficient series would sink them into the synonymy of *castanonotus*, even though they may look quite distinct when only a few extremes of each are examined.

Young birds molting into adult plumage may be told from fully adult individuals even after the former have attained the general coloration of the latter, by the fact that the former have the white feathers of the rump, upper tail-coverts, thighs, and underparts with fine black shaft streaks, while in the latter the shafts are white like the vexilla.

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[29] Vögel Afrikas, vol. 1, 1900, p. 646.

The African pygmy falcon is a bird of the lowlands, and consequently is scarce or absent in large parts of the interior of Ethiopia. It is not known from altitudes greater than 5,200 feet, (1.520 meters). Erlanger[30] met with it in northern and southern Somaliland, the Hawash region, southern Gallaland, and southern Shoa. He found birds in breeding condition in July in southern Somaliland, and in January in the Sagon valley, in southern Shoa.

Order GALLIFORMES

Family PERDICIDAE

COTURNIX COTURNIX ERLANGERI Zedlitz

Coturnix coturnix erlangeri Zedlitz, Journ. f. Ornith., 1912, p. 244: Cunni, near Harrar, Ethiopia.

Specimens collected:
Female, Adis Abeba, Ethiopia, January 12, 1912.
Male, Adis Abeba, Ethiopia, January 13, 1912.
Male, Alaltu, Ethiopia, January 16, 1912.
Male, Arussi Plateau, Ethiopia, February 15, 1912.

This race is characterized by the fact that the throat patch in the male is dark brownish, or even blackish brown, while in *africana* it is reddish brown. The male from Adis Abeba is extreme in this respect, having this patch deep fuscous brown; the one from Arussi Plateau is lighter, but is acquiring the dark feathers; while the specimen from Alaltu has the throat patch itself dark brown but the stripes from the postero-lateral angles of this patch to the auriculars light reddish brown. It seems from this altogether inadequate series that the birds have a subadult plumage similar to the adult type of *africana*—with the throat patch and associated stripes reddish brown, and that in the molt into adult plumage the patch itself is molted first and then the transverse throat stripes. The male from the Arussi region has many of the reddish subadult feathers mixed with the new, dark ones of the adult plumage.

The flanks vary considerably in color. The bird with the darkest throat also has the darkest flanks, the feathers of which have dark fuscous longitudinal stripes on either side of the white median area while in the male from the Arussi Plateau these markings are light chestnut brown instead of fuscous. The other male is intermediate in this respect just as it is in the color of the throat.

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[30] Journ. f. Ornith., 1905, pp. 224–226.

The female is somewhat less streaked on the breast and flanks than are two females of *africana* from South Africa, but this is due in part, at least, to the fact that the feathers are fresh and the whitish edges not worn off, thereby hiding the streaks of the underlying feathers.

Erlanger [31] writes that in four males from Ethiopia the dark throat patch is not interrupted by a white band. In all three birds collected by Mearns there is a white band separating the throat patch and its postero-lateral transverse stripes from the tawny cinnamon of the breast, just as in *africana* and typical *coturnix*.

There is a vague possibility, worth investigating, that *erlangeri* may be the breeding form of the highlands of the coastal strip of eastern Africa a good distance to the south of Ethiopia—even into Tanganyika Territory. At a meeting of the Deutsche Ornithologische Gesellschaft held in February, 1914,[32] Schuster recorded *Coturnix africana* as an abundant breeding bird in the Uluguru Mountains, Tanganyika Territory, at elevations of 1,000 meters (3,300 feet) and higher, in bare and barren regions. His remarks are not very clear as briefly summarized in print but apparently these birds are very darkly colored as compared with lowland ones. Professor Neumann then called attention to the fact that while the species *C. coturnix* was known to breed in northeastern Africa it was not known to nest in Tanganyika Territory (except in the higher parts of the Uluguru Mountains), and that Zedlitz had named the Abyssinian bird *erlangeri*. Whether the dark, mountain birds are *erlangeri* also is not mentioned, but the suggestion seems implied, perhaps quite unintentionally, that the Uluguru birds have something in common with those of the Abyssinian highlands.

In connection with Neumann's remarks it is interesting to note that Van Someren [33] writes that *Coturnix coturnix africana* breeds in June in Kenya Colony (Kyambu and Embu). Lönnberg [34] also records it as breeding in Kenya Colony.

Some of the published records of *africana* really refer to the red phase of typical *coturnix* (the so-called *baldami*). This applies to the Egyptian records [35] and probably to some Sudanese records as well.[36]

The three males collected vary in size, the wing lengths being 101.5, 108.5, and 114 millimeters, respectively, while that of the female is 109 millimeters.

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[31] Journ. f. Ornith., 1905, p. 156.

[32] Reported on by Heinroth, Journ. f. Ornith., 1914, p. 292.

[33] Nov. Zool., vol. 29, 1922, p. 32.

[34] Kung. Sv. Vet. Akad. Handlgr., 1911, p. 53.

[35] Nicoll, Handlist Birds of Egypt, p. 81.

[36] See Nicoll, Ibis, 1922, p. 701.

COTURNIX DELEGORGUEI DELEGORGUEI Delegorgue

Coturnix delegorguei DELEGORGUE, Voy. Afr. Austr., vol. 2, p. 615, 1847: Oury, *i. e.* Upper Limpopo River.

Specimens collected:

Three adult males and one adult female, Tertale, Ethiopia, June 8–11, 1912.

One adult male and three adult females, and one young male, Turturo, Ethiopia, June 15–16, 1912.

One adult female, Mar Mora, June, 1912.

Two adult females and one adult male, Nyiro Mountains, south of Lake Rudolf, Kenya Colony, July 13, 1912.

One female, southeast of Lake Stefanie, Kenya Colony, May 12, 1912 (native coll.)

One male (?) Woms River, Kenya Colony, May 27, 1912 (native coll.)

The colors of the soft parts as recorded by Mearns for two male birds are as follows: Iris hazel brown; bill grayish olive-brown, slightly yellowish at base below; feet and claws brownish flesh color.

The last two specimens listed above were collected by one of Mr. Frick's black boys and the sexing is consequently quite unreliable. Mearns was not present when these two birds were taken.

The juvenal male collected at Turturo looks as though it was not more than a month old. It is less than half grown in size but is fully feathered. It would appear from this that the breeding season in Ethiopia is around April and May. This agrees with Erlanger's observations, as he found nests of this species during late April and May.[37]

This young bird resembles the adult female in general, but differs from it in the following particulars: It has the entire top of the head light reddish brown with a median stripe of white; the feathers of the upper parts of the body lack the blackish vermiculation in their brownish areas but otherwise agree with those of the adult, having broad black bars broadly separated by light and dark brown ones; it has the remiges lightly vermiculated with light brownish on the external margins of the outer webs; the feathers of the rump and the upper tail coverts lack the light transverse bars present in the adult; the underparts are lighter, less rufous, more grayish, the feathers of the throat, breast, and flanks subterminally spotted and barred with fuscous; bill (in dried state) yellow.

I have seen no juvenal females, but inasmuch as the male described above is generally similar to the adult female, it would seem that the juvenal plumage is alike in the two sexes. A series of 15 adult females examined show great variation, chiefly with regard to the number, size, and intensity of the spots on the breast and upper part of the abdomen. Van Someren[38] writes that this variation appears not to be due to season, but possibly to age.

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[37] Journ. f. Ornith., 1905, p. 156.

> Two breeding females are very heavily spotted on the breast and upper abdomen, while another is *apparently assuming male plumage* [italics mine]. Others, again, have the breast heavily washed with olive-grey, others are almost uniform brownish.

From the spotted condition of the young, it would seem that the least spotted, most uniformly colored birds would be the oldest, and vice-versa, provided that age is in any way correlated with the variation.

The plumage of the male presents some points of interest. One bird (from Tertale, U.S.N.M. No. 243340) still in the process of acquiring adult plumage has the entire chin and throat white, with no black patch at all. It still has a line of light, immature feathers in the middle of the lower breast and upper abdomen, surrounded on either side by the black and reddish feathers of the incoming plumage. Another specimen (also from Tertale, U.S.N.M. 243339) is in similar plumage but the entire throat and chin are practically bare, the sheaths of the new feathers just protruding from the skin. However, those in the area destined to become the black patch are black, while those to either side of it are white. Doctor Van Someren[39] writes that buff stripes on the feathers of the underside of males are a sign of immaturity. The white-throated bird has white, not buff, stripes on a few of the flank feathers.

In full adult plumage the black anchor mark on the throat varies in its median, posterior extent. In some the broad middle part extends considerably beyond its junction with the two lateral "arms" of the anchor; in others these arms seem to be one continuous band posteriorly delimiting the throat patch. In some individuals the white sub-ocular stripe is posteriorly continuous with the white of the throat; in others it is cut off entirely by the black jugular stripes.

This species does not vary geographically to any appreciable extent in the African Continent and consequently no mainland races have been differentiated. Sclater and Mackworth-Praed[40] were unable to separate Sudanese from South African examples. The series collected in Ethiopia and extreme northern Kenya Colony by Mearns average slightly larger than a series from the rest of Kenya Colony and Tanganyika Territory, but the differences are small. The wing lengths in Abyssinian birds vary from 96–101 (males); 94–102

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[38] Nov. Zool., vol. 29, 1922, p. 32.

[39] Idem, p. 32.

[40] Ibis, 1920, p. 841.

(females), while tropical East African birds present the following figures: 93–97 (males); 93.5–99 millimeters (females).

Bannerman[41] has recently reviewed the systematics of the harlequin-quail. Besides the typical form of continental Africa he recognizes *C. d. histrionica* Hartlaub[42] of Sao Thomé, distinguished by its darker coloration, and *C. d. arabica*, new at that point (type locality, Lahej, Yeman Province, southwestern Arabia), of southern Arabia, characterized by being much paler brown than the nominate form. I have seen no specimens of either *histrionica* or *arabica* and can not pass judgment on them. They seem to be valid, as their respective regions frequently produce races distinct from the parent stock of the African mainland.

Aside from the specimens taken, Mearns noted this bird as follows: Lake Rudolf, July 5–8, 3 birds; Box Canyon near Lake Rudolf, July 9, 3 seen; southeast of Lake Rudolf (from the southern tip of the lake to about 25 miles southeast of it), July 10–12, 16 birds observed; Indunumara Mountains, July 13–18, 230 birds, mostly near a spring where they came to drink; plains at base of Endoto Mountains, July 19–20, 200 birds; 27 to 45 miles south of Malele, July 30, 20 seen; Guaso Nyiro River, July 31 to August 3, 50; Lekiundu River, August 4–8, 30 birds; Tana River, August 16, 1 seen.

Family PHASIANIDAE

FRANCOLINUS SEPHAENA GRANTII Hartlaub

Francolinus grantii Hartlaub, Proc. Zool. Soc. for 1865, p. 665, pl. 39, fig. 1, 1866: Unyamwezi country, Tanganyika Territory.

Specimens collected:

One adult male, spring south of Black Lake Abaya, Ethiopia, March 26, 1912.

Eleven adult males, one immature male, and five adult females, Gato River near Gardula, Ethiopia, March 27 to April 25, 1912.

One adult male, one immature male, and one adult female, Bodessa, Ethiopia, May 25, 1912.

One adult male, Sagon River, Ethiopia, June 4, 1912.

One adult male, Tertale, Ethiopia, June 8, 1912.

One adult male and one adult female, El Ade, Ethiopia, June 13, 1912.

One adult female, Turturo, Ethiopia, June 16, 1912.

One immature male, Yebo, Ethiopia, June 21, 1912.

One adult male, two adult females, and one immature female, Endoto Mountains, Kenya Colony, July 20–23, 1912.

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[41] Bull. Brit. Orn. Cl., vol. 49, 1929, pp. 108–109.

[42] Rev. Mag. Zool., 1849, p. 495; Sao Thomé Island.

One adult female and one immature female, 24 miles south of Malele, Kenya Colony, July 29, 1912.

Three adult males and four adult females, Tana River near mouth of Thika River, Kenya Colony, August 20–25, 1912.

Soft parts: Adult male—iris hazel; bill olivaceous brown; feet brownish red; claws olive.

In addition to the above 40 specimens I have examined 5 specimens of *grantii* from Tanganyika Territory and 12 others from various parts of Kenya Colony, making 57 examples of this form in all.

The races of this variable francolin are extremely puzzling. Long series of specimens usually show that no characters are reliable subspecific indices, yet, on the whole, there seem to be several more or less distinct forms in southern and eastern Africa. Sclater[43] recognizes 7 subspecies, while Mackworth-Praed[44] lists 7 named, and 4 unnamed races. These last four appear, from the description, to be merely intermediates, and in a species as variable as the present one, intermediates are best left unnamed, as their subsequent identification would be well nigh hopeless. Of the 7 races, I have assembled for this study some 82 specimens belonging to 4 forms. I have seen no material of *zambesiae*, *rovuma*, or *jubaensis.* None of these occur in the region represented by the present collection, but the last two are found in immediately adjacent territory.

After studying the conclusions reached by Neumann,[45] Erlanger,[46] C. H. B. Grant,[47] Mackworth-Praed,[48] Zedlitz,[49] Van Someren[50] and Sclater,[51] as well as the abundant material at hand, I have decided that the following are synonyms of *grantii:*

Francolinus ochrogaster Hartlaub, Journ. f. Ornith., 1882, p. 327: Upper Nile.

Francolinus granti delutescens Mearns, Smiths. Misc. Coll. vol. 56, 1911, no. 20, p. 3: Base of Mt. Kenya.

Francolinus sephaena subspecies 3, Mackworth-Praed, Ibis, 1922, p. 112; Northern Guaso Nyiro to Marsabit and westwards to south of Lake Rudolf.

Francolinus sephaena subspecies 4, Mackworth-Praed, Ibis, 1922, p. 112: extreme northern boundary of Kenya Colony (Moyale, Wajheir, etc.).

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[43] Syst. Avium Ethiop., 1924, pp. 79–80.

[44] Ibis, 1922, pp. 110–113.

[45] Journ. f. Ornith., 1904, pp. 356–358.

[46] Idem, 1905, pp. 151–155.

[47] Ibis, 1915, pp. 10–13.

[48] Idem, 1922, pp. 110–113.

[49] Journ. f. Ornith., 1914, pp. 656–661.

[50] Nov. Zool., vol. 29, 1922, pp. 30–31, and Journ. E. Afr. and Uganda Nat. Hist. Soc. 1926, pp 36–40.

[51] Syst. Avium Ethiop., 1924, pp. 79–80.

For the present I prefer to keep *schoanus* separate, although the material seen (six specimens) is not too convincing.

The present race, then, has an extensive range covering the following area: Central Tanganyika Territory (Dodoma and Saranda) through the Unyamwezi districts to Kenya Colony, all of Kenya Colony except the coastal area north of Lamu (mouth of the Tana River), eastern and northern Uganda (Nile Province and Turkwell districts), southeastern Sudan (Mongalla, Lado, Rejaf), and the Shoan Lake districts (north to the Abaya Lakes). Two specimens from Lake Zwai and the Arussi Plateau, however, are nearer to *schoanus*. In south central Ethiopia *grantii* seems to be a lowland bird, getting up to about 4,500 feet; while *schoanus*, in its southern range, at least, is found higher up in the mountains, but not at any very great altitudes.

The long series of *grantii* illustrates the various types of plumage with the exception only of the natal down. The juvenal plumage varies in darkness just as does the adult feathering. Thus, a juvenal female "still attended by parents," collected in the Endoto Mountains, is very light, while three young males from Ethiopia are much darker and differ among themselves in the intensity of their coloration. The feathers of the forehead, crown, and occiput have broad grayish brown margins in juvenal birds, while older birds have these feathers with browner, darker, less grayish borders. Also in young birds the feathers of the upper back are transversely marked with blackish bands as in adult females. Van Someren[52] writes that in the juvenal plumage the superciliaries are buff, but in the specimens at hand these streaks are whitish as in adults. The reddish throat and neck spots are not present until the following plumage, when they appear first as a transverse throat line of triangular, terminal chestnut patches on the feathers and a few black spots from the gape to the inferior hind margin of the eye. Then reddish-tipped feathers grow in on either side between the throat band and the auriculars, meeting the black subocular spots, and finally the throat band grows wider in a posterior direction. The wing molt is a topic worth investigation. The material examined indicates that the fourth or fifth (from the outside) primaries are the first to be replaced, after which molt proceeds in both directions. The post-juvenal molt is a complete one.

In the adults great variations in coloration and, to a lesser extent, in size, are the rule, making it difficult to give a detailed description of the typical plumage. The sexes are easily distinguished by the pattern of the upper parts, the feathers of the scapulars, interscapulars, and upper back generally being narrowly barred with black in the females, and without bars in the males. However, within either sex, differences occur, the extremes of which might, at first sight. be thought of as different subspecies. A dark male from Gato River, Ethiopia, has the entire under parts except the middle and lower abdomen, dull tawny olive, the feathers with narrow whitish shaft streaks; the middle and lower abdomen tawny buff. The other extreme is represented by a male from Dodoma, Tanganyika Territory, which has the lower breast pale tawny olive with wide white shaft streaks; the feathers of the upper abdomen white with a narrow longitudinal tawny olive wavy line on each web, the rest of the underparts white, with only a very slight tinge of buffy on the flanks and under tail coverts. This bird also has the lower back and upper tail coverts grayer and paler than the dark Gato River specimen, and has arrow-shaped, blackish subterminal marks on the upper tail-coverts, which the other lacks. One specimen (a male from Tana River, near mouth of Thika River, Kenya Colony) has faint reddish shaft stripes on some of the feathers of the abdomen and flanks. approaching in this respect the more southern race, *rovuma*.

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[52] Journ. E. Afr. and Uganda Nat. Hist. Soc. 1926, p. 38.

The wing length may be taken to suffice for the size variations in *grantii*. It is as follows:

Males. 137.5–156, average 145.6 millimeters.

Females, 127–144, average 136 millimeters.

These figures are somewhat different from those given by Mackworth-Praed,[53] the extremes being greater, and surpassing his figures for both minimum and maximum. The size of the series examined was slightly larger in his case (64 specimens).

The following notes on the nesting of this francolin are extracted from Mearns' field books.

A set of three eggs was found at Gato River (4,000 feet), Ethiopia, April 25, 1912. The parent birds were collected. Another set of three eggs at the same place, April 29, 1912; a third set of three eggs. same locality, May 12, 1912; and a fourth set on May 3. The eggs are soiled white, unspotted, measure 40 by 29, 40 by 30 and 40 by 29.5 millimeters; the shells are enormously thick and hard. On June 3, 1912, two dried eggs were found at Sagon River, Ethiopia.

On July 21, 1912, in the Endoto Mountains, Kenya Colony, the birds were found in pairs, a male and a female being killed together with the same shot. This indicates that the breeding season is later in Kenya Colony than in Ethiopia.

What may have been a sign of territorial desire on the part of two males was witnessed at Gardula on the Gato River, on the 10th of April, when two cock birds were seen fighting. Both were killed with the same shot.

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[53] Ibis, 1922, pp. 110–113.

Francolinus sephaena grantii was abundant in the Sagon Valley at the foot of the 6-mile hill below the Bodessa camp. At Bodessa itself but one covey were seen out of which two parents and one young were collected. Later, still at Bodessa, on several occasions a few were seen beside some pools, but were probably of the same covey. They seemed very rare in this locality. The parents referred to above made a great outcry at human approach and flew up on dry branches above the grass, screeching as loudly as possible in an attempt to distract attention from the brood of half-grown young. They are at least as noisy as any of the francolins, and more so than some.

Besides the specimens collected, this francolin was met with as follows: March 18, North Lake Abaya, east side, 6 seen; March 19, North Lake Abaya, east side, 20; March 20, North Lake Abaya, east side, 10; March 21–23, North Lake Abaya, southwest, 20 seen; March 23–26, South Lake Abaya, 75 seen; March 26–29, near Gardula, 25 birds; March 29 to May 17, Gato River, 1,000; May 17, Gato River, 100; May 18, Dokato Village to Kormali, 4 seen; May 19, Sagon River, 12 seen; May 19 to June 3, Bodessa, 50; June 3, Bodessa and Sagon River, 50; June 3–6, Sagon River, 200; June 6, Sagon River, 20 birds; June 7, Tertale, 50 seen; June 7–12, Tertale, 200 birds; June 12, El Ade, 10 seen; June 12–14, El Ade, 20; June 14, Mar Mora, 20; June 15, Turturo, 20; June 15–17, Turturo, 100 seen; June 17, Turturo to Anole, 25 birds; June 19, from Wobok to near Saru, 20 seen; June 20, Yebo, 20; June 21, Karsa Barecha, 50 birds; June 22, Malta, 20; June 23, Upper Chaffa village Boran, 25 seen; July 19–20, Plains at base of Endoto Mountains, 25 birds; July 21–24, Endoto Mountains, 200; July 25, to Er-re-re, 25 seen; July 26, to Le-se-dun, 25; July 28, to 18 miles south of Malele, 25; July 29, to 27 miles south of Malele, 100; June 30, to 45 miles south of Malele, 100; July 31, to Guaso Nyiro, 25; August 14, to Tana River from Tharaka Rest House, 25; August 15, Tana River to Camp 2, 25; August 16, Tana River to Camp 3, 25; August 17, Tana River to Camp 4, 10; August 18, Tana River to Camp 5, 15; August 19, Tana River at Camp 5, 10; August 20, Tana River to Camp 6, 30; August 20–23, Tana River at Camp 6, 50; August 23, to mouth of Thika River, 25; August 23–26, at mouth of Thika River, 200; August 26, to Camp 1, Thika River, 100; August 27, to Camp 2, Thika River, 2; August 28, to west of Ithanga Hills and Thika River, 25; August 29, Athi River to Donio Sabuk, 10.

FRANCOLINUS SEPHAENA SCHOANUS Heuglin

Francolinus schoanus Heuglin, Orn. Nordost-Afr., vol. 2, p. 891, 1873: Shoa.

Specimens collected:
Male, Tollo, Ethiopia, December 14, 1911.
3 males 1 female, Sadi Malka, Ethiopia, December 20–21, 1911.
Male, Sadi Malka, Ethiopia, February 2, 1912.

This form is exactly like the preceding one in color, but is somewhat larger. However, the size limits of the two overlap and I am not at all certain that the distinctness of *schoanus* can be maintained. I have retained it, following Mackworth-Praed [54] and Sclater [55] because both these workers have examined more material of this form than have I, and I feel that their conclusions are not to be rejected on the basis of a series of only the six birds listed above.

The male from Tollo is considerably smaller than those from Sadi Malka, and is also browner, less grayish above, particularly on the top of the head, and may belong to a different race.

The present series present the following measurements.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Tollo	♂	143	91	21. 0	42. 0
Sadi Malka	♂	148	92	21. 0	42. 5
Do	♂	149	99	21. 5	44. 0
Do	♂	149	95	21. 0	42. 5
Do	♂	156	93	20. 0	42. 0
Do	♀	138	84	20. 5	39. 0

As will be seen by comparison with the data given for *grantii* these measurements all come within the limits of that form.

The sexes differ in plumage as in *grantii* and the variations are much the same in the two forms. One male (U.S.N.M. No. 243214) has unusually long and apically upturned tarsal spurs.

Both Sclater and Mackworth-Praed [56] give the range of *schoanus* as Ethiopia, except the eastern part. This is rather inaccurate as the form of south central Ethiopia (from the Abaya Lakes to the Kenya border) is *grantii*, and no one knows what form inhabits the extreme southwestern part of the country. In the southern part of its range *schoanus* seems to keep higher up in the mountains than does *grantii*.

The east Abyssinian form *spilogaster*, of which I have seen but a single specimen, is very similar to the present form, but has some small reddish shaft stripes on the feathers of the lower underparts. However, this varies, and specimens from the Goolis Mountains, British Somaliland, are said [57] to lack them entirely, in which case the slightly larger size of *spilogaster* seems the most reliable difference. All the races of *Francolinus sephaena* are average ones; the species seems to be in an active phase of evolution.

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[54] Ibis, 1922, p. 113.
[55] Syst. Avium. Ethiop., 1924, p. 80.
[56] Sclater, Syst. Avium Ethiop., 1924, p. 80, and Praed, Ibis, 1922, p. 113.

FRANCOLINUS AFRICANUS ULUENSIS Ogilvie-Grant

Francolinus uluensis OGILVIE-GRANT, Ibis, 1892, p. 44: Machakos, Kenya Colony.

Specimens collected:

One adult female, Thika River, at big western bend, Kenya Colony, August 29, 1912.

Soft parts: Iris brown; bill brownish black, dirty yellow at base, on sides, and below; feet brownish yellow; claws brown.

I have not enough material to attempt a revision of the races of *Francolinus africanus* and therefore follow the arrangement given by Sclater [58] adding to his list the subsequently described form *archeri.* Even if we restrict our attention to the northeast African races, the situation leaves much to be desired. Mackworth-Praed's review [59] is unfortunately vague with regard to Ethiopian, Somali, and north Kenian birds, chiefly because of lack of adequate material. It is difficult to show the ranges of the races on a map, as the ranges are distinct chiefly in the one direction a map does not show, altitude. Thus, *ellenbecki* occurs on Mount Arussa, for example, while *archeri* is found at the base of that mountain.

The race *uluensis* is the form found in the interior of Kenya Colony, chiefly in the highlands, but recorded from the Taveta district as well (altitude about 2,500 feet (750 meters)).

The single specimen collected differs from three males from Guaso Nyiro, Fort Hall, and Nairobi (all Kenya Colony) in that it has the entire throat spotted with black; the spots are smallest anteriorly and elongate and become terminally expanded towards the base of the throat. The three males vary in this respect. A young male (spurs present merely as small knobs) has the entire throat immaculate white; the other two have the lower and lateral parts spotted, only the upper and middle throat being unmarked. However, the spots are not elongate, but roundish. The reddish marks on the breast vary in shade from bright chestnut to a deep rufous bay, being brightest and most chestnut in the young male, darkest in the adult female. The female is browner, less grayish, above than the two adult males, but the young male is even brighter brown.

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[57] By Mackworth-Praed.

[58] Syst. Avium Ethiop., 1924, p. 81.

[59] Ibis, 1922, pp. 115–117.

In the female the light tawny brown of the cheeks and auriculars continues as a narrow band on either side of the lower throat, the two bands meeting on the ventral side, completely cutting off the black and white supraorbital stripe from the black-spotted margin of the throat patch. In some males the connection exists and the tawny brown of the sides of the head is, in turn, cut off from the ventral band just posterior to the white throat patch, while in others the condition described in the female holds.

The tropical, eastern form *uluensis* differs from typical *africanus* in that the rufous breast feathers are broadly tipped with plain bluish gray in the latter and are variegated in the former. Mackworth-Praed[60] writes that *uluensis* is more heavily barred beneath than is *africanus* but this is not upheld by the material I have examined. The only difference I can find between two South African birds (*africanus*) and the four from Kenya Colony is that the bars are closer together in the former.

The present specimen was molting the remiges when shot, as the next to the outermost one is just an inch or so long in both wings. The other primaries are full grown and show no sign of molt.

On August 29, 1912, while marching from the Thika River to a camp south of the Athi River and of Mount Donio Sabuk, Mearns wrote as follows:

> * * * On leaving the Thika River we traversed a rolling country with some trees and bush to a low bush-covered plateau beyond which we at last obtained a splendid view of the Athi Valley * * * There were many *Francolinus uluensis* at our last camp on the Thika; and I saw a flock of 8 or 10 as we descended from the plateau to the Athi.

Earlier in the month (August 15–21) while collecting along the Tana River, he noted birds questionably referred to this form, but did not collect any.

FRANCOLINUS AFRICANUS ELLENBECKI Erlanger

Francolinus psilolaemus ellenbecki Erlanger, Journ. f. Ornith., 1905, p. 151: Saemana, on the Abera-Ginir road, Gallaland.

Specimens collected:

One male adult and 1 female adult, Arussi Plateau, 10,500 feet, (3,150 meters), Ethiopia, February 18, 1912.

In the Journal of the Washington Academy of Sciences[61] I described these two specimens as *Francolinus africanus fricki*, new subspecies, being confused at the time as to the characters of *ellen-*

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[60] Ibis, 1922, p. 116.

[61] Vol. 18, no. 14, 1928, p. 408.

becki. However, there can be no doubt but that they are identical, and Erlanger's name must stand. Since the description of *fricki*, the type (the male listed above) has been examined by Sclater, who pronounced it the same as *ellenbecki* and by Conover, who likewise came to the same conclusion.

Mackworth-Praed[62] writes that *ellenbecki* is like *psilolaemus* but grayer, less brown above, and darker gray below, size apparently similar. He gives the wing measurements of *psilolaemus* as 164–167 millimeters in males, 164 in a female. Both the present specimens are larger than these *psilolaemus*, each having a wing length of 174 millimeters. A female of *psilolaemus* examined is generally noticeably smaller than either of the two *ellenbecki*, and has a wing 165 millimeters long. The latter race is darker, more abundantly and heavily marked on the breast, abdomen, and flanks than the former. There can be no question but that these two forms are closely allied (more closely than to any other race of the species) and may be told from all the others by the heavily spotted throat, and the reddish and fuscous bars on the distal parts of the remiges, the proximal two-thirds of which are reddish. In the other races the terminal third of the remiges is fuscous somewhat freckled with reddish, but in these two the freckles are concentrated into bars.

This form is the representative of *psilolaemus* in the very high districts of Ethiopia (Arussi district to northern Shoa). The actual localities from which it has been recorded are Saemana, the Arussi Plateau, and Mount Albasso. Erlanger[63] records it from Antoto, but Conover writes me that Antoto birds are practically topotypical of *psilolaemus*, and I must say that the Antoto bird seen by me is certainly of that race.

The male bird has the breast darker, the reddish patches on the abdomen larger, and the black V-shaped abdominal markings less numerous than the female, which is slightly darker above. The measurements are as follows: male—wing 174, tail 81, culmen from base 27 millimeters; female—wing 174, tail 83, culmen from base 26.5 millimeters.

According to Mearns' field notes, this bird is abundant in the heath zone up to 11,000 feet (3,300 meters).

FRANCOLINUS AFRICANUS ARCHERI Sclater

Francolinus africanus archeri SCLATER, Bull. Brit. Orn. Cl. 48, 1927, p. 51: Mount Daro, 7,000 feet (2,100 meters), east of Harrar.

Specimens collected:

Four female adults, 2 female immature, Bodessa, Ethiopia, May 21–28, 1912.

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[62] Ibis, 1922, p. 117.

[63] Journ. f. Ornith., 1905, p. 151.

Soft parts: Iris brown or hazel brown; bill black or olivaceous black, the basal half of the mandible, and the sides and base of the maxilla dull yellowish; feet dull yellow or yellowish olive; claws brown.

Two of the adults are marked "♂," but as they have no sign of any tarsal spurs, and are not immature, I list them as females, which they probably are.

H. B. Conover, who has examined the present series, informs me that they are the same as a specimen from the lowlands at the base of Mount Arussa which was compared with, and found to be like the type of *archeri* by Doctor Hellmayr. Conover writes me that the Arussa bird is slightly paler, less buffy, on the underparts than the type of *archeri*, but that the type is probably stained.

The present series constitutes the southernmost record for the race, and an extension of the known range of about 400 miles. As far as I know, the subspecies is known from only three localities (and eight specimens)—the type locality, Mount Daro, which is the northernmost spot at which it has been taken, the specimen in the Field Museum from the base of Mount Arussa, and the present series from Bodessa.

The immature birds are browner above than the adults, and lack the black marks on the sides of the white throat patch. The younger of the two (U.S.N.M. 243207) has no black spots behind the auriculars either, while the older individual (U.S.N.M. 243206) has a white streak spotted with black, running from the posterior margin of the ear-coverts to the base of the neck where it connects with a similar transverse band which extends across, and caudally terminates, the white throat area. This specimen has a few small black spots on the lateral margins of the throat. The younger bird has much more rufous on the breast and sides, and much less of the blackish wavy barrings on the underparts than has the older one. The younger specimen is also more buffy below than the other.

The four adult birds vary in the ground color of the abdomen, which is light yellow buff in one, almost white in another, and slightly grayer in still another. Likewise the amount of deep rufous markings on the breast varies, as does also the intensity of the dark bars of the flanks.

The measurements of the adult birds collected are:

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Bodessa	♂ = ♀	157	71	24	32.0
Do	♂ = ♀	150	74	24	39.0
Do	♀	139	74	25	33.0
Do	♀	143	66	25	35.5

Mearns' field notes on this form are given in full below.

> First found at this camp (Bodessa, end of May and early June). They are in twos or threes, occasionally in families of half-grown young. Once I surprised 20 of them together in a canyon, near water, about 2 p. m. I have never seen one on the ground alive; they fly up from the grass and bushes with loud chirping cries and fly strongly for a long distance without ceasing their rapid wing strokes. Then they raise their wings and settle in the grass. At first their flight is low, then they mount higher as they acquire speed. In flight the flocks sometimes keep together, but where there are only two or three they often fly in different directions. The flock of 20 surprised in a canyon separated and flew up different sides to the grass cover. They appear to have finished breeding.

FRANCOLINUS CASTANEICOLLIS CASTANEICOLLIS Salvadori

Francolinus castaneicollis SALVADORI, Ann. Mus. Civ. Genova, vol. 26, p. 542, 1888: Lake Ciar-Ciar; Shoa.

Specimens collected:

Six male adults, 5 female adults, 1 adult unsexed, 2 male immatures, 1 female immature, Arussi Plateau, Ethiopia, February 18–28, 1912.

Soft parts: Iris brown; bill and feet reddish brown in young birds, red in adults (both sexes); claws olive brown.

In studying the races of this species I have seen 35 specimens of three of the four known subspecies. This notable series of a bird somewhat uncommon in collections exhibits color variations considerable enough to raise some doubt as to the distinctness of *bottegi* and *castaneicollis*. Mackworth-Praed has recently studied the francolins and writes (Ibis, 1922, p. 118) that these two races are closely allied, "* * * and possibly identical," but that *bottegi* (9 specimens) appears, "* * * to be brighter above and duskier below," than in a single specimen of *castaneicollis*. This I do not find to be true.

According to Neumann,[64] the difference between *bottegi* and *castaneicollis* is the color of the upper back (interscapulars, etc.). In the former the feathers of the upper back have no reddish-brown edges. Such edges are present only on the sides of the body, so that the upper parts present a black mottled appearance up to the reddish nape, while in the latter race all the feathers of the upper back have wide margins of bright reddish brown, giving a strong reddish tone to the entire upper back. The typical race is said to inhabit the mountainous districts from the Hawash River and Harrar to eastern Arussi-Gallaland, while *bottegi* occurs in the area between eastern Arussi and the Abaya Lake country. Mearns' specimens, therefore, come from more or less intermediate territory, but considerably nearer to that of *castaneicollis* than of *bottegi*. What might at first sight be taken to be both types of plumage are represented in the series, but the *bottegi* type of coloration (blackish above) seems to be due to the wearing away of the reddish-brown margins. There is, of course, considerable individual variation as well. In the more blackish individuals the shaft stripes are narrower and paler, less rufous, than in brown ones.

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[64] Journ. f. Ornith., 1904, pp. 352–354.

The ranges and characters of the races of this francolin are as follows:

1. *F. c. castaneicollis.*—Mountainous areas from Harrar and the Hawash River through Arussiland and northern Gallaland to Shoa.

2. *F. c. bottegi.*—The lake region of southern Shoa and the country immediately adjacent to the southeast, south to Lake Stefanie. Differs from the nominate form in the character given above; that is, the absence of bright chestnut edges to the feathers of the upper back.

3. *F. c. ogoensis.*—British Somaliland (in the highlands only). Differs from *castaneicollis* in being more grayish, less brownish in the dorsal ground color; the interscapulars grayer, less blackish; the crown more grayish, less chestnut; and the chestnut color of the neck paler. Of this race I have seen no adults, but only two immature birds. They are grayer above than the young *castaneicollis* collected by Mearns and have the lower flanks somewhat barred, a condition present, but less developed, in the young female *castaneicollis*, and absent in the two young males. Also the brown on the breast feathers is more extensive in *ogoensis* than in *castaneicollis*, and gives a more uniformly brown appearance to the breast in the former race. *Ogoensis* is somewhat smaller as well.

4. *F. c. gofanus.*—The Gofa and Kullo districts of southern Ethiopia. This race, which I have not seen, is said to differ from *castaneicollis* and *bottegi* in that even the old males have no black on the forehead while in the latter two forms not only the old but even the young males, and, to some extent, females as well, have black foreheads. Also the brown color of the upper breast is more reddish brown in *gofanus* than in *bottegi*. The upper parts are more brownish in the former, not so contrastingly black and white as in the latter.

The series studied in the present connection reveals several interesting points as regards the plumages of this francolin. Young birds are quite different from adults in appearance, and at first sight might be taken for a distinct species. They lack the bright rufous brown on the back, wings, and underparts, so characteristic of mature birds. The juvenal underparts are more abundantly marked with broad, long blackish or fuscous-black streaks than are those of adults, but in both cases, the chin and throat are unmarked and whitish. The forehead in young birds is lighter, less blackish, more brownish than in older individuals, while the crown and occiput are lighter, more rufous, less fuscous in the latter than in the former. This is particularly true of the females.

The two juvenal specimens of *ogoensis* are remarkable in that the forehead is not black in them, but brownish, only slightly darker than the crown. Unfortunately these birds are unsexed. Whether this is a character of that race I can not say, but Mackworth-Praed[65] makes no mention of it in his review. Neumann, in describing *gofanus*, writes that the main difference between this race and *castaneicollis* is that old males of the former lack the black forehead, while in *castaneicollis* and *bottegi* even young males and to an extent old females have a distinct black forehead. It may be, then, that the two young *ogoensis* with brownish foreheads are females.

Young birds have the feathers of the back (posterior to the interscapulars), rump, upper tail coverts, and rectrices narrowly banded with whitish, the bands edged with blackish. This condition is also found in some adults but in old birds these feathers vary greatly. In some there is no sign of any barring; the feathers are uniformly dark, dull, grayish, olive brown with narrow fuscous shaft streaks, the feathers terminally margined with lighter grayish brown; in other specimens the shafts are white with a subterminal tear-shaped white spot, the shaft and the spot bordered by fuscous and each feather with a subterminal V-shaped whitish bar.

Other variable characters in adult birds are the lores, the superciliary stripes, the amount of white on the upper part and of black on the breast. The lores vary from pale buff, each feather narrowly edged with blackish, to almost wholly black. The superciliaries are black in some, black in their anterior halves and brown posteriorly in others. The amount of white on the upper parts depends on the width of the white marks on the feathers. Mackworth-Praed, in his review of the African francolins, records, "*Francolinus castaneicollis subsp. 1*" ranging from Harrar district eastward where it merges with *ogoensis*. It is said to differ from *bottegi* by having less white on the back, the upper parts generally duskier and less brownish, and the chestnut of the neck somewhat paler. Judging by the amount of variation in the white markings of the upper back in the present series, I feel that this character is not a reliable criterion for the establishment of races. As regards the coloration of the breast, the black markings become less prominent with age; old males have the breast almost uniform brownish. What really happens is that the black markings become more basal, more restricted distally, with successive molts, and in old birds are practically completely covered by the overlapping brown terminal spots of the feathers immediately anterior to them. The brown spots increase in size as the black ones decrease toward the bases of the feathers.

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[65] Ibis, 1922, p. 118.

This species is entirely a highland form and, together with two others, *erckeli* Rüppell, to the north, and *jacksoni* O. Grant, to the south, forms a distinct group of mountain francolins, all three of which are large, brightly colored birds. The amount and extent of bright rufous marks increase from north to south, *erckeli* having the least, *castaneicollis* considerably more, and *jacksoni* the greatest development of these stripes.

So little is known of the ecological range of this bird that any information is welcome. Fortunately Mearns noted on several of the specimens the nature of the habitat, and from these notes we learn that this francolin lives in the juniper zone, the camphor zone, and in the yellowwood zone. Neumann[66] writes that it occurs in the bushy thickets of the highest plateaus but comes down in forested river valleys and to the edge of the bamboo forests. Its altitudinal range, according to Neumann, is between 6,500 and 10,500 feet (1,950 to 3,150 meters), but it occasionally is found lower down, as Mearns shot one at Aletta which has an altitude of only 6,000 feet (1,800 meters).

The breeding season seems to be in January, February, and March. The adult male and female collected on February 28 were a mated pair according to Mearns' notes.

Fifteen adult males present the following measurements: Wing, 215–240; tail, 122–140; culmen, 22–27; tarsus, 61–66.5 millimeters. Eleven adult females: Wing, 188–200; tail, 103–114; culmen, 20–24; tarsus, 46–58 millimeters. The tarsal spurs vary with the age of the males, increasing in size with the passing of years.

FRANCOLINUS CASTANEICOLLIS BOTTEGI Salvadori

Francolinus bottegi Salvadori, Ann. Mus. Civ. Genova, vol. 38, p. 652. 1898: Badditu, near Lake Stefanie.

Specimens collected:

Male adult, Botola, Ethiopia, March 4, 1912.
Male adult, Aletta, Ethiopia, March 10, 1912.

The characters and range of this form have already been discussed under the typical race and need not be repeated here. The bird from Botola, while certainly referable to *bottegi*, is slightly intermediate between it and *castaneicollis*. It has deep chestnut lateral margins on some of the interscapulars. The Aletta specimen is a typical example of its subspecies.

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[66] Journ. f. Ornith., 1904, pp. 352–354.

In its general habits this race appears to be similar to *castaneicollis*, but very little is known of either. On the whole, its range is altitudinally lower than that of the nominate race. The breeding season is in January, as Neumann [67] found a clutch of five eggs at Gardula on January 13.

FRANCOLINUS SQUAMATUS MARANENSIS Mearns

Francolinus schuetti maranensis Mearns, Smiths. Misc. Coll., vol. 56, No. 14, p. 1, 1910: Maranu, Kilimanjaro, 5,000 feet.

Specimens collected:

Male and female, escarpment, 7,390 feet, Kenya Colony, September 7, 1912.

The races *maranensis*, *kapitensis*, and *keniensis* are all one and the same, the alleged differences being due to age, sex, and wear. The first name, having page priority over the other two, stands, and the others become synonyms.

Lönnberg [68] also made a critical study of these birds and was unable to uphold Mearns' races.

This francolin is very variable, the underparts becoming more uniform with age. C. H. B. Grant [69] writes that females average lighter below than males, but this is not always the case. Van Someren [70] writes that his series does not bear this out. It is true that the female collected by Mearns is much lighter below than is the male, but the other specimens examined indicate that this difference is due more to age than to sex.

Mackworth-Praed [71] writes there are four races of this species in Kenya Colony—*zappeyi*, in Kavirondo; *dowashanus*, south of Loita Plains to the Tanganyika border; *maranensis*, Kilimanjaro to Mount Kenia, Solai, and the Aberdare Mountains; and a race for which there is no name, referred to by him as "subsp. 2," apparently confined to high ground—Mau, Ravine, Laikipia, etc. On geographic grounds Mearns' two birds should belong to this race, which is said to be similar to *zappeyi* but larger. The female is contrasting enough in its ventral coloration to match specimens of *zappeyi* but the male certainly is not. Furthermore the birds have wings of 182 and 186 millimeters, respectively, while the highland form is said to have wing lengths of from 192 to 198 millimeters. Granvik [72] apparently had birds like these two, and reached the same conclusions as myself.

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[67] Journ. f. Ornith., 1906, p. 299.

[68] Arkiv f. Zool., vol. 9, No. 14, 1915, pp. 1–22.

[69] Ibis, 1915, p. 19.

[70] Nov. Zool., vol. 29, 1922, p. 27.

[71] Ibis, 1922, p. 133.

[72] Journ. f. Ornith., 1923, Sonderheft, pp. 59–60.

The race *dowashanus* is rather puzzling. In the original description[73] Madarász writes that it is similar to *squamatus* but generally lighter and grayer, the chief color of the underparts being creamy white, the feathers with grayish-brown median stripes. The range is given above. Three birds in the Museum of Comparative Zoölogy from Chantwara, Bukoba, Tanganyika Territory, are very light even for *zappeyi*, to which race they belong, and might pass examination as *dowashanus*. However, a female *zappeyi* from Kibati, Belgian Congo, of the subspecific identity of which there can be no question, because of locality, is just as white below as the Chantwara specimens. I have seen no typical *dowashanus* and am not in a position definitely to decide the merits of the form, but either it is a poorly marked version of *zappeyi* or the Chantwara birds are intermediates which would extend the range of *dowashanus* considerably to the westward.

When reporting on the birds collected by Loveridge in the Usambara and Uluguru Mountains, Tanganyika Territory,[74] I recorded a specimen of *maranensis* and wrote that "* * * with the limited material at hand * * * I can not see any difference between *maranensis* and *dowashanus*." This is misleading, as these two are perfectly distinct, but at the time I had not examined specimens of *zappeyi*.[75] The bird referred to is *maranensis*, but is slightly different from any other example seen by me. The throat is pure white, bordered on each side by a wide band of blackish spots on a white background; the lores and the region around and behind the eyes are also whitish, finely and very sparsely dotted with black.

The color of the upper parts is quite variable in all races of this francolin. In *maranensis* some individuals have these parts deep, rich brownish, while others have the feathers broadly margined with grayish, giving a lighter effect. The typical race *squamatus* of Cameroon is perhaps the most variable in this respect, the extremes being very different.

In fresh adult plumage *maranensis* has the feathers of the nape laterally edged with light grayish, making that area appear very distinct from the rest of the back. These edgings wear off until they are almost entirely lacking, and in worn plumage the nape and interscapulars are no longer noticeably different. Granvik[76] reports that in his female specimen the under tail coverts are not light on the edges as in the males, but have "* * * two dirty yellow patches situated close to each other." This is not true for the present example, which has these feathers broadly margined laterally with light buffy. In some of the feathers there is a subterminal, dark brownish, transverse bar, which cuts off the terminal parts of the light lateral edges, causing them to appear as apical spots. This may be what Granvik found in his bird.

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[73] Ann. Mus. Hung., vol. 13, 1915, p. 394.

[74] Ibis, 1928, pp. 75–76.

[75] Since this manuscript was completed, Conover (Auk, vol. 45, 1928, p. 356) has named this bird *usambarae* (range—the Usambara Mountains). I find that this race is valid, as the characters given by Conover (based on 5 birds) are the same as the differences pointed out above.

[76] Journ. f. Ornith., 1923, Sonderheft, pp. 59–60.

In the males the number of tarsal spurs varies somewhat. The bird collected by Mearns is quite young and has the spurs represented merely by a horny callosity on each tarsus; other males have a well-developed pair on the lower half of the tarsus and a slight swelling on the upper half, while one individual has two well-developed spurs on each foot. Granvik[77] notes that one of his males has two spurs on the right foot but only one on the left, while another has two on each foot.

Oberholser[78] has described the juvenal plumage of *maranensis* (under the name *schuetti*). His description agrees with a juvenal female from Ngong Forest, Nairobi (A. Loveridge collection), except that the latter has the feathers of the breast and sides with white shafts diverging terminally into broad white apical spots. Oberholser merely records " pale shaft lines " and makes no mention of the large apical spots.

The birds appear to breed throughout the year, but nests are recorded most frequently from March to June and from December to January. Van Someren[79] writes that in Uganda *zappeyi* nests twice a year, but whether this means that the same individuals nest two times (not in immediate succession as in ordinary double-brooded birds) a year or that the species has two main nesting seasons but that any one bird breeds in only one of them is not clear.

PTERNISTES LEUCOSCEPUS (Gray)

The races of this spur fowl are somewhat puzzling, and I have therefore taken pains to assemble adequate series for this study. All in all I have examined 104 specimens of all 5 races, as recognized by Sclater.[80] The ranges of some of the races in Sclater's list[81] need modification and more detailed statement. This I have attempted to do in the following paragraphs.

1. *P. l. leucoscepus*.—Eritrea, Bogosland, northern and northeastern Somaliland, and northern Ethiopia, southwest to the region about Sadi Malka, where it intergrades with 3 and 2.

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[77] Journ. f. Ornith., 1923, Sonderheft, pp. 59–60.

[78] Proc. U. S. Nat. Mus., vol. 28, 1905, p. 834.

[79] Ibis, 1916, p. 216.

[80] Syst. Avium Ethiop., 1924, pp. 91–92.

[81] Idem.

2. *P. l. muhamed-ben-abdullah.*—Somaliland (except northern and northeastern parts) and northern Kenya Colony (Jubaland) west to the Lorian swamp, and northeast of the Northern Guaso Nyiro, and to Marsabit.

3. *P. l. holtermülleri.*—South Ethiopa (lowlands of southern Shoa and the Abaya Lakes district to Kenya border, where it intergrades with the preceding).

4. *P. l. infuscatus.*—Southern Kenya Colony from the north of Mount Elgon and Lake Baringo, through the Kikuyu, Ukambani, and southern Masai districts to northern Tanganyika Territory, south to the Pangani River.

5. *P. l. keniensis.*—The interior of Kenya Colony from the Northern Guaso Nyiro River to Mount Kenia.

Of the so-called *P. l. kilimensis* I have seen the type and one other. I consider this form identical with *infuscatus.*

The extent of the whitish area on the remiges varies in all the races. The outermost primary extends as much as half an inch beyond the white patch on the inner web of the next remex in some birds while in others it either just reaches the tip of the white area or falls just short of it. On the average the white is slightly more extensive in males than in females.

In identifying specimens of this francolin subspecifically, consideration must be allowed for the condition of the plumage. Fresh feathers have wide terminal white areas bordered laterally with slightly lighter, more grayish brown than the brown of the length of the feathers. These lighter tips wear off, giving a worn specimen a darker appearance.

PTERNISTES LEUCOSCEPUS LEUCOSCEPUS (Gray)

Francolinus leucoscepus G. R. GRAY, List. Spec. Bds. Brit. Mus., pt. 5, Gallinae, p. 48, 1867: Ethiopa (new name for *Perdix rubricollis* Cretzschmar not Gmelin).

Specimens collected:

Male and female Sadi Malka, Ethiopia, December 21, 1911.
Male, Sadi Malka, Ethiopia, January 26, 1912.
Two males, Hawash River, Ethiopia, February 4–10, 1912.

Soft parts: (male), bare skin of chin and throat red, changing to yellow on upper neck.

These five specimens are not typical *leucoscepus*, but are nearer to that form than to any other. They are intermediate in coloration between the typical race and *muhamed-ben-abdullah.* C. H. B.

Grant[82] writes that the latter race has the upper parts of *infuscatus* and the under parts of *leucoscepus*. However, the present five birds are darker below than typical *leucoscepus*, not above, as *muhamed-ben-abdullah* should be, according to Grant.

One of the males has but one spur on each tarsus, while the other three have two. The males have wings measuring 210, 211, 215, and 219 millimeters, respectively, while the female has a wing 206 millimeters long, but is molting.

Zedlitz[83] writes that this spur fowl is a denizen of the lowlands in sparsely vegetated areas, and that it does not occur at altitudes of more than about 1,900 or 2,000 feet (600 meters). It is very common in the northern stretches of Danakil-land, where it finds cover in the denser thickets along the stream banks. The breeding season is in early spring—January to April.

PTERNISTES LEUCOSCEPUS MUHAMED-BEN-ABDULLAH Erlanger

Pternistes leucoscepus muhamed-ben-abdullah ERLANGER, Orn. Monatsb., vol. 12, p. 97, 1904: Between El Uak and Bardera, South Somaliland.

Specimens collected:

Three female adults, 18 miles southwest of Hor, Kenya Colony, July 2, 1912.

Male adult, Endoto Mountains, Kenya Colony, July 20, 1912.

Female adult, south Endoto Mountains, Kenya Colony, July 23, 1912.

Male adult, 35 miles north of Northern Guaso Nyiro, Kenya Colony, July 29, 1912.

This race is intermediate between *leucoscepus* and *infuscatus* in coloration. From the former it may be told by its darker upper parts (narrower white shaft streaks and darker margins), and from the latter by its lighter under parts (wider white areas).

In adult males the spurs vary in number. Thus, one individual has one on each tarsus; another has two on the left and one on the right leg; still another has two on each; and one bird has three on the left tarsus and two on the right. In the last case, the shorter. more tibial of the spurs on the right leg is very broad basally and looks as though it might really be a fusion of two.

This race of the spur fowl was noted as follows: Dry River south of Hor, July 1–2, 30 birds; Dussia, July 3–4, 10 seen; Indunumara Mountains, July 13, 2 noted; plains at base and to south of Endoto Mountains, July 19–24, 110 observed; Er-re-re, July 25, 100 seen; Le-se-dun, July 26, 25 noted; Malele to about 45 miles south of Malele, July 27–30, 175 or more birds seen in all, but some noted every day.

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[82] Ibis, 1915, p. 21.

[83] Journ. f. Ornith., 1910, pp. 355–356.

PTERNISTES LEUCOSCEPUS HOLTERMÜLLERI Erlanger

Pternistes leucoscepus holtermülleri ERLANGER, Orn. Monatsb., vol. 12, p. 98, 1904: Lake Abaya, Ethiopia.

Specimens collected:

One male, 2 females, White Lake Abaya, east side, Ethiopia, March 18–19, 1912.

One female, White Lake Abaya, southeast side, Ethiopia, March 21, 1912.

One female, The Bridge, Lake Abaya, Ethiopia, March 23, 1912.

One male, White Lake Abaya, south side, Ethiopia, March 27, 1912.

One male, Black Lake Abaya, Ethiopia, March 27, 1912.

Two males, near Gardula, Ethiopia, March 26–27, 1912.

Seven males, five females, Gato River, near Gardula, Ethiopia, April 1–28, 1912.

Two males, two females, Sagon River, May 19 to June 6, 1912.

One young female, one adult male, Tertale, Ethiopia, June 8–9, 1912.

One male, Mar Mora, Ethiopia, June 14, 1912.

One adult male, one immature female, Turturo, Ethiopia, June 16–17, 1912.

Three adult females, Yebo, Ethiopia, June 20–21, 1912.

Immature male, immature female, Malata, Ethiopia, June 22, 1912.

Soft parts:

1. Juvenal male: Iris brown; bill plumbeous black tipped with horn color; tarsi slightly reddish brown; feet and claws olive brown.
2. Adult male: Iris hazel; sides of base of mandible, upper edge of nostril, and naked sides of face red, throat yellow slightly tinged with red next to the bill (chin); feet, spurs, and claws black.
3. Adult female: Iris brown; bill brownish black; upper edge of nostril, naked sides of face, chin, and upper throat brick red, lower throat yellow. The color of the upper throat is variable as another female had " only the chin * * * slightly marked with red."

This race has the dark margins of the feathers of the breast much grayer than those of the abdomen, and typical examples may be easily identified by this character. Southern specimens (south of Sagon River to Kenya border) are more or less intermediate between *holtermülleri* and *muhamed-ben-abdullah* and are less easily told. However, the specimens from this intermediate territory examined are nearer to the former than to the latter race. Farther east along the Ethiopian-Kenyan border, the birds are probably nearer to the latter form, but I have seen none from there.

The juvenal male does not quite agree with Van Someren's description of the corresponding stage of the southern form *infuscatus*.[84] According to this author the chick, "* * * is dark chestnut on the head, with a pale sandy superciliary stripe." The present specimen has the forehead and a wide superciliary (a quarter the width of the head) on each side pale sandy buff, the middle of the crown and occiput dark chestnut, the whole area bordered with blackish brown. The nape, scapulars, wing coverts, interscapulars, and back, are light tawny brown mottled with blackish and have narrow white shaft streaks, expanding apically into triangular white spots; remiges tawny like the back, irregularly banded with light buffy, the bands bordered with blackish; rump, upper tail coverts, and rectrices similar to the remiges but the bands closer together; sides of head, lores, and subocular region pale sandy buff, like the forehead; auriculars brown; chin and throat white; breast, abdomen, flank, sides, thighs, and under-tail coverts whitish heavily spotted subterminally with blackish brown, the spots narrowly edged with rufous tawny; soft parts as mentioned above.

The three immature birds are noticeably lighter generally than corresponding examples of *infuscatus*, and agree with this stage of *muhamed-ben-abdullah*, to judge from Van Someren's description of the latter.[85] The young male is slightly more rufous above and on the sides of the abdomen than the two females, and is a little larger as well.

This race also exhibits great variation in the number of tarsal spurs. Six males have 1 on each foot; 2 have 1 on the right and 2 on the left; 10 have 2 on each, and 1 has 2 on the right and 3 on the left foot.

The Shoan bare-throated spur fowl was noted at the following places: Gidabo River, March 15–17, 2 seen; "Black" or North Lake Abaya, March 18–20, 135 birds; Lake Abaya, March 21–23, 100; "White" or South Lake Abaya, March 23–26, 100; from South Lake Abaya to near Gardula, March 26–29, 30; Gato River, March 29–May 17, 1,100 birds; Kormali Village, May 18, 40; Sagon River and Bodessa, June 3–6, 85 seen; Tertale, June 7–12, 500 birds; El Ade, June 12–14, 64 birds; Mar Mora, June 14, 50 seen; Turturo, June 15–17, 150; Anole, June 17, 50 birds; Wobok, June 18, 50 noted; near Saru June 19, 100; Yebo, June 20, 100 birds; Karsa Barecha, June 21, 200 seen; Malata, June 22, 100 noted; Boran, lower Chaffa village, 25 birds; Upper Chaffa village, June 24, 20 seen; Chaffa, June 24–25, 25 observed.

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[84] Journ. E. Afr. and Uganda Nat. Hist. Soc. 1926, p. 100.

[85] Idem.

At Gato River several sets of eggs were obtained, as follows:

April 24, set of seven eggs.

May 7, set of four eggs.

May 11, set of four eggs and a set of five eggs.

PTERNISTES LEUCOSCEPUS INFUSCATUS Cabanis

Pternistes infuscatus CABANIS, Journ. f. Ornith., 1868, p. 413: Lake Jipe, near Kilimanjaro.

Specimens collected:

Female, Tana River, below Camp No. 3, Kenya Colony, August 16, 1912.

Female, Tana River, at mouth of Thika River, Kenya Colony, August 25, 1912.

Male and female, Thika River, southwest of big bend, Kenya Colony, August 28, 1912.

Soft parts: Chin and sides of face red; throat yellow; iris brown; bill olive brown, reddish at base; upper edge of nostrils red; feet and claws black (both sexes).

This race is quite variable and may eventually be considered as including *keniensis*, which is only questionably distinct. The four birds collected vary considerably in the amount of reddish brown on the underparts, and, to a lesser degree, the width of the white shaft stripes on the feathers of the upper back.

Birds of this race were noted on every day of the march from the Tharaka district to the Athi River, August 11–31. About 10 birds a day was the usual observation.

PTERNISTES LEUCOSCEPUS KENIENSIS Mearns

Pternistes leucoscepus keniensis MEARNS, Smiths. Misc. Coll., vol. 56, No. 20, p. 1, 1911: west slope of Mount Kenya.

Specimens collected:

Female adult, Guaso Nyiro River, 10 miles northeast of Archer's Camp, Kenya Colony, August 3, 1912.

One male adult, five female adults, one female immature, one female young, Lekiundu River, Kenya Colony, August 4–8, 1912.

Doctor Van Someren[86] has produced evidence which casts no little doubt as to the validity of this race. However, the type, and the six adults listed above collected by Mearns and seven others in the Museum of Comparative Zoölogy are generally darker than specimens of *infuscatus* and lack white edges on the feathers of the thighs. In his original description of *keniensis* Mearns gave as one character the absence of transverse bars on the wings and tail, which instead of being barred are minutely speckled and vermiculated. This holds true for all but 2 of the 13 adults studied. In these two, the vermiculations are arranged in fairly definite bars.

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[86] Nov. Zool., vol. 29, 1922, p. 26.

A downy chick in the Museum of Comparative Zoölogy has the head as in the juvenal *holtermülleri* described above (see p. 126); the back is pale tawny with a wide dorsal, and, on each side, a lateral band of dark sepia brown mixed with blackish, wings tawny, banded anteriorly, and elsewhere spotted with sepia. The underparts are pale sandy buff, slightly more buffy on the chest than elsewhere.

The juvenal bird is like that of *holtermülleri* in every respect, but very slightly darker on the back. The immature bird is molting into adult plumage but has narrower shaft stripes on the feathers of the upper parts.

One of the adult females from Lekiundu River has an unusually large amount of buffy white on the abdomen, flanks, and under tail coverts; even more than in many specimens of typical *leucoscepus*, the lightest of all the races. However, it seems, from the geographical standpoint at least, better to consider this example partially albinistic than to use it as an argument against the validity of *keniensis*, as it is also lighter than ordinary *infuscatus* to which it would then have to be referred.

Mearns made no notes of the colors of the soft parts of this race, but the following were made of other examples by W. R. Zappey and Dr. Glover M. Allen. Chin, wattles, and eye ring red to scarlet; throat skin yellow to orange.

Besides the specimens procured, this form was seen as follows: Northern Guaso Nyiro River, July 31 to August 3, 30 birds; Lekiundu River, August 4–8, 1,000 birds; Meru swamp, August 9, 40 noticed.

Family NUMIDIDAE

NUMIDA MITRATA REICHENOWI Grant

Numida mitrata reichenowi Ogilvie-Grant, Ibis, 1894, p. 536: Makarungu, Ukambani district, Kenya Colony.

Specimens collected:

Male, Tharaka district (2,000 feet (600 meters)) Kenya Colony, August 14, 1912.

Male, Tana River at camp No. 4, Kenya Colony, August 18, 1912.

Two males, Tana River at mouth of Thika River, Kenya Colony, August 26, 1912.

Soft parts: Iris brown; wattles, forehead, and front of face red; neck, sides of face, and orbital region blue; helmet reddish brown;

bill dark brownish red above at base, bright red below at base, tipped with greenish olive.

The great variability of the bony helmet in this guinea fowl has been the source of much confusion among ornithologists and has been made the basis of several races now usually considered as indistinguishable. I have not examined material of all the proposed races, but as far as the available material goes, the following forms seem distinct.

1. *N. mitrata mitrata.*—Madagascar and Comoro Islands, the coastal districts of East Africa from southern Kenya Colony to the delta of the Zambesi; inland along the Zambesi Valley to the Rhodesian border. (Specimens examined: Madagascar 2, Tanganyika Territory 7.)

2. *N. mitrata coronata.*—Southeastern Africa north to southern Rhodesia where it intergrades with *mitrata.* (Specimens examined: Natal 1.)

3. *N. mitrata reichenowi.*—Kenya Colony from the district around Mount Kenia (Meru, Embu) to the Ukamba, Loita, and Kedong districts, south through the Teita and Taveta country into Tanganyika Territory, where it is known to occur in at least the following area: Kilimanjaro district (Moshi and Kahe) southwestward through Arusha to Mtali's, Zengeragusu, along the east side of the Wembere steppes to Mdjengo's, Singida, and south to Mbonoa, Itigi, and Saranda. Typical *reichenowi* probably does not occur any great distance to the east of Dodoma as the Kilosa district is inhabited by birds somewhat intermediate between *reichenowi* and *mitrata*, but much nearer to the latter, with which they are best identified.

4. *N. mitrata maxima.*—This form I have not seen, but according to Sclater [87] it occurs in the high plateau of southern Angola.

5. *N. mitrata marungensis.*—None seen; said to occur in Katanga and north Rhodesia.

6. *N. mitrata intermedia.*—Of this race I have seen no material. Sclater [87] gives its range as the Ankole country west of Lake Victoria.

From this form he considers the following to be only doubtfully distinct: *N. ansorgei* Hartert, from Lake Nakuru, Kenya Colony; *N. uhehensis* Reichenow, from Uhehe district, Tanganyika Territory; *N. rikwae* Reichenow, from Lake Rukwa, Tanganyika Territory, and *N. frommi* Kothe, also from Lake Rukwa. The last two are, from geographical reasons, certainly the same, and the other two have definite characters which, however, may be individual rather than racial. Thus, *uhehensis* is said to have a shorter, blunter bony helmet than *reichenowi* and to differ from *intermedia* in the color of the wattles, which are entirely red in *uhehensis*, and blue tipped with red in *intermedia*. As mentioned above, birds from the region between Dodoma and Kilosa are intermediate in character between *mitrata* and *reichenowi*, but nearer to the first named, to which race I have referred them. However, the birds from this region may represent what Reichenow meant by *uhehensis*. Doctor Van Someren[88] lists a doubtful specimen of *uhehensis* from Makindo (south of Handini) Tanganyika Territory, which is probably *mitrata*, as are also three birds from Mkaraji, Uluguru Mountains (recorded by me[89] as *uhehensis*).

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[87] Syst. Avium Ethiop., 1924, p. 96.

Numida ansorgei is recognized as a species by Van Someren,[90] but Hartert[91] writes that the differences supposed to characterize this form do exist, but are probably individual.

The two main characters used in subspecific taxonomics of guinea fowl are size and shape of the helmet, and the color of the wattles. Within rather large limits the helmet varies with age and sex and consequently must be used with caution. The wattles have usually been considered more constant, but Schuster[92] has shown that fresh specimens vary in this respect more than the dried skins would indicate. A female from Kilosa in the Museum of Comparative Zoölogy is unusual in this respect; it has the right wattle small, bluntly pyramidal in shape, and entirely red (as in *reichenowi*), and the left one long, narrow, and basally blue (as in *mitrata*).

The plumage changes of this species are rather curious in that there seem to be five stages, quite a large number for a gallinaceous bird.

1. *Natal down.*—Not seen, but described by Van Someren[88] as "* * * pale buff below and light orange brown above, slightly paler on the back. The head and dorsum are striped with blackish brown, while the flanks and wings are spotted with this color."

2. *Juvenal plumage.*—Several specimens in various stages of postjuvenal molt examined indicate that in first feathering the bird is remarkable in that natal down is not replaced on the top of the head, which is light cinnamon tawny (Van Someren's orange brown) with a wide central, lengthwise patch, and two lateral stripes of blackish brown above each eye. Most birds have a complete postnatal molt, but the present species is an exception.

In this plumage typical *mitrata* is slightly more rufous than *reichenowi*.

The bony helmet is very small and blunt, but definitely noticeable by the time the postjuvenal molt is reached.

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[88] Nov. Zool., vol. 29, 1922, p. 25.

[89] Ibis, 1928, p. 76.

[90] Journ. E. Afr. and Uganda Nat. Hist. Soc., 1925, p. 7.

[91] Nov. Zool., vol. 34, 1927, p. 31.

[92] Journ. f. Ornith., 1926, p. 163.

Upper parts rufous brown coarsely vermiculated with blackish, each feather with a large subterminal V-shaped blackish band, and tipped with pale buff; remiges brown edged with white for the whole length of the feathers on the outer web and distally on the inner one, the outer web mottled with buff; underparts grayish buff somewhat mottled anteriorly.

3. *Immature plumage.*—This plumage is acquired by a postjuvenal molt which is complete except for the head, which still retains its original covering of short, stiff natal down.

It is in this stage that the bird first acquires the spotted plumage. The mantle and interscapulars are dark brown spotted with white, each spot surrounded by a black line; wings, back, rump, upper tail coverts, and tail barred with buffy and blackish on a brown background; chin and upper throat almost bare, a few brownish feathers present; lower throat and upper breast feathers brownish black with white shaft stripes; lower breast, sides, flanks, and thighs spotted with white; abdomen dark buffy gray.

4. *Subadult plumage.*—With the assumption of this plumage the head becomes entirely bare except for a few plumulaceous feathers around the ear openings; the plumage becomes like the well-known adult type, except that the feathers of the lower throat with white shaft stripes are retained from the immature plumage, and that the upper breast is spotted like the rest of the under parts, but the spots are smaller.

5. *Adult plumage.*—Similar to the preceding, but the lower throat, nape, and upper breast finely barred with black and white, not spotted.

Aside from the specimens taken, this guinea fowl was observed at the following localities: Tharaka district, August 12–13, 40 seen; Tana River, August 14–26, 200 or more noted; Thika River, August 27, 25; west of the Ithanga Hills, August 28, 20 seen; near Athi River, August 31, about 50 birds.

NUMIDA MELEAGRIS (Linnaeus)

The tufted guina fowl is represented in the present collection by 16 specimens belonging to three races. In studying the subspecific variations of this bird, an additional series of 9 individuals was assembled, makng 25 in all. My conclusions agree with those reached by Sclater[93] so far as the material examined goes. No specimens of Dubois' Congo form *inermis* have been studied and I can not therefore pass judgment on that form. The following eastern races are valid:

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[93] Syst. Avium Ethiop., 1924, pp. 97–98.

1. *N. meleagris meleagris.*—Characterized by the black feathers on the dorsum of the neck being much more extensive and abundant than in the other races; the wattles blue without red tips, and the helmet never more than about 18 millimeters in height. This form ranges from the Lake Chad district eastward across the French and Anglo-Egyptian Sudan to Kordofan, south to the Bahr-el-Ghazel, east through the Gojjam, Amhara, Tigre, Danakil, Ankober, and Hawash districts of Ethiopia, through Eritrea to the Yemen district, southwestern Arabia.

2. *N. meleagris major.*—Characterized by the very small, decurved, hook-shaped helmet (sometimes wanting); fewer neck feathers; wattles as in *meleagris* but slightly smaller; general size larger than *meleagris*. The geographic range of this race is as follows: Upper White Nile to North Uganda to Ankole, east through Uganda proper to the east of Lake Victoria, including both north and south Kavirondo districts, southern Ethiopia east at least as far as the Arussi-Gallaland plateau. Sclater[93] gives the range as extending from Uganda to Kilimanjaro, but I can find no record of this bird east of the Rift Valley.

The forms *neumanni*, *omoensis*, and *toruensis* are said to be probably identical with *major*.[93] However, it should be noted that Hartert[94] keeps *toruensis* distinct although sinking *omoensis* into synonymy. *Toruensis* is said to have, "* * * only an apology of bristles and connects the bristly subspecies with those without bristles on the forehead. It differs in several ways * * * from the other forms."

3. *N. m. macroceras.*—Characterized by having the helmet larger and longer than in any of the other races; otherwise similar to *meleagris*. Range: The northern part of the Rift Valley in Kenya Colony from northeast of Mount Kenia, the Meru district, the Lekiundu and Northern Guaso Nyiro Rivers to Lake Baringo, the Sugota Valley, the Suk and Kamassia regions, to the Turkwell country, and the southern end of Lake Rudolf.

Lönnberg's form *rendilis* is a synonym of *macroceras*.

4. *N. m. somaliensis.*—Characterized by having the wattles tipped with reddish; the nasal bristles larger and more strongly developed than in the other forms, almost no feathers on the hind neck, often lacking entirely. This form ranges from British and Italian Somaliland westward through the Harrar, Galla, and Arussi districts of Ethiopia and Jubaland in Kenya Colony west to Waghier and the Lorian Swamp.

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[93] Syst. Avium Ethiop., 1924, pp. 97–98.

[94] Types Bds. Tring Mus., Nov. Zool., vol. 34, 1927, p. 30.

NUMIDA MELEAGRIS MELEAGRIS (Linnaeus)

Phasianus meleagris LINNAEUS, Syst. Nat., ed. 10, vol. 1, p. 158, 1758: Africa, i. e. Nubia, Upper Nile, ex. Hasselquist.

Specimens collected:
Female, near Tollo, Ethiopia, December 15, 1911.
Male, Moulu, Ethiopia, December 16, 1911.

As in all the races, the present one shows great variation in the form of the helmet. The Moulu bird has it decurved and narrow, another male from Eritrea has it more or less vertical (the front slope about 45°, the rear one practically 90°) but the tip is slightly recurved. The nasal bristles also vary, being much better developed in the Tollo female than in the male from Moulu, or than in birds from Eritrea, the Blue Nile, and Gondar (20 miles north of Lake Tsana). The bird from Gondar shows an interesting plumage variation; the feathers of the middle and lower back have the white spots extremely narrow, and appear vermiculated rather than spotted. The spots become distinct again on the rump, but even there, and on the mantle as well, they are smaller, less rounded, more elongate in a direction transverse to the feathers, than in the other five specimens examined.

The series studied is too small to give an adequate picture of the size variations of *meleagris*. Three males have wings of 252, 282, and 285 millimeters, respectively, while three females (one doubtfully sexed) present the following measurements: 241, 260, and 270 millimeters.

Mearns made no record of the colors of the soft parts, but Maj. R. E. Cheesman wrote on the label of the Gondar specimen (which came to the Museum of Comparative Zoology from the Cheesman collection) as follows: Wattle and skin below eye, azure blue. He also noted, " * * * one flock had many half-grown chicks" at the time of collection (October 30) which indicates that the breeding season in northern Ethiopia is probably August and thereabouts.

NUMIDA MELEAGRIS MAJOR Hartlaub

Numida ptilorhyncha var. *major* HARTLAUB, Abhandl. Bremen, 1882, pp. 216, 217, 1883: Wakkala, in the Bari country near Gondokoro.

Specimens collected:
Male, Gidabo River, Ethiopia, March 16, 1912.
Two males, Lake Abaya (east), Ethiopia, March 19, 1912.
Female, Bodessa, Ethiopia, May 22, 1912.
Female, Bodessa, Ethiopia, June 1, 1912.
Male, near Bodessa, Ethiopia, June 6, 1912.

Soft parts: Middle of chin, wattles, sides of face, and nape blue; neck and throat, slate color; helmet, brown, tipped with horn color; bill, greenish horn color; feet and claws, olivaceous black (in male); feet, grayish black, the scales edged with horn color, the claws, blackish, widely tipped with horn color (in female).

A great deal of variation occurs in the spotting of the inner webs of the primaries. A large series of birds of different ages may show this to be an index of age, a point worth investigating.

This race is larger than the typical form. The four males have wing lengths as follows: 275, 285, 290, and 300 millimeters, respectively. The female has a wing 272 millimeters in length. The nasal bristles vary to lesser extent than in *meleagris*, the maximum development being less in the present race; the minimum the same in both. Erlanger's [95] form *neumanni*, which is the same as *major*, is said by its describer to have the wattles tipped with reddish as in *somaliensis*. That this character variation is without geographic significance is shown by one of the males from the east shore of Lake Abaya in the present collection. This bird (U.S.N.M. No. 243167) has the wattles narrowly tipped with red, although the other male from the same place has them entirely blue.

At Gato River near Gardula, Mearns found a number of nests with eggs of this guinea fowl, as follows:

April 21, a set of six eggs brought in by a Galla.

April 25, a set of seven eggs, all fresh.

May 1, a set of two eggs, rather dark in color.

May 1, a set of 10 eggs, slightly incubated.

May 3, a set of eight eggs.

May 6, a set of nine eggs brought in by a Galla.

May 12, three sets as follows:

Set of 14 eggs, measuring from 53.5 by 42.5 to 51 by 40 millimeters. The largest clutch seen. The eggs are large, rather pale and not much pigmented. Incubation was advanced as they contained large embryos.

Set of nine eggs, 52 by 40 and 54 by 38.2 to 53 by 37.5 millimeters. Medium sized eggs, rather pointed at the lesser end. Uniformly covered with small faint pigment blotches, something like turkey eggs. Contained large embryos.

Set of 13 eggs, 49.5 by 39 to 54 by 39 millimeters. These eggs have a rather deep brown color, are thickly covered with small pigment spots, and are deeply indented. They contained large embryos.

In his field notebook Mearns made the following entry, written at Bodessa, about this bird:

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[95] Journ. f. Ornith., 1905, p. 138.

Abundant in large flocks in the Sagon Valley. Up here (Bodessa) they are scarce and have different habits. They are in thick, heavy grass, and, when flushed only fly up high enough to clear the grass and find more open ground where they can run. They are scarce, in singles or pairs, and are silent. The only one I have heard was a lone bird being worried by a large goshawk. It made a great outcry and puzzled the hawk, which watched the grass from bush tops trying to get a chance at the bird. When flushed it only flew about six yards and was very hard to flush a second time. No eggs or young seen here.

NUMIDA MELEAGRIS MACROCERAS Erlanger

Numida ptilorhyncha macroceras ERLANGER, Orn. Monatsb., vol. 12, p. 97, 1904: Muki River, Lake Rudolf.

Specimens collected:

Male and female, Endoto Mountains (south), Kenya Colony, July 21, 1912.

Male, Endoto Mountains (south), Kenya Colony, July 22, 1912.

Male, immature female, Guaso Nyiro River (10 miles east of Archer's post), Kenya Colony, August 3, 1912.

Female adult, female immature. Lekiundu River, Kenya Colony, August 8, 1912.

The plumage changes are similar to those described for *Numida mitrata reichenowi*.[96] The same curious retention of the natal down on the dorsum of the head is true of this species as well. The plumages of the two species are practically identical in the natal down, juvenal, and immature stages (according to Van Someren,[97] no specimens in natal down seen by me). In fact, the two immature birds listed above were identified to this form, rather than to *N. mitrata reichenowi* only because of the adults taken with them. The nasal tufts of bristles do not appear until the subadult plumage. As in *reichenowi*, the immature and subadult stages have blackish feathers with broad white shaft stripes on the throat and upper breast.

Erlanger [98] lists birds from the Abaya Lakes district of Ethiopia as *macroceras*, following Neumann.[99]

The birds collected in that region by Mearns agree very closely with the characters of *major*, while *macroceras* is a form with a longer, larger helmet, and apparently does not range north into Ethiopia.

The helmet is very variable in the available series of this form. In adult males (it is larger and better developed in males than in females), it attains greater lengths than indicated by Erlanger [98] who gives its variational limits as 23 to 30 millimeters. However, he writes that southern examples have larger, longer helmets than more northern ones. The present series varies in this respect from 30 to 52 millimeters. It is obvious that Erlanger's birds are not what he calls them but somewhat intermediate between *major* and *macroceras*, but closer to the former race.

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[96] See pp. 130–131.

[97] Journ. E. Afr. and Uganda Nat. Hist. Soc., 1925, p. 9.

[98] Journ. f Ornith., 1905, p. 138.

[99] Idem, 1904, p. 408.

Seven adult males have wings varying from 281 to 292 millimeters in length (288.5 millimeters average); the corresponding figures for three adult females are 272 to 287 millimeters (280 millimeters average).

Aside from actual specimens collected, Mearns observed this bird as follows: Dry River south of Hor, July 1–2, feathers found; plains at base and to south of Endoto Mountains, July 19–24, 250 birds; near Er-re-re, July 25, 25 seen; No. Guaso Nyiro River, July 31 to August 3, 25 noted; Lekiundu River, August 4–8, about 700 birds; Meru Swamp, August 9, 200 seen.

ACRYLLIUM VULTURINUM (Hardwicke)

Numida vulturina Hardwicke, Proc. Zoöl. Soc., 1834, p. 52: "West Africa," *errore;* I propose Tsavo, Kenya Colony.

Specimens collected:

Male, southeast Lake Stefanie, Kenya-Ethiopian border, April 23, 1912.

Two males, 2 females, Endoto Mountains (north base), Kenya Colony, July 20, 1912.

The specimen from southeast of Lake Stefanie indicates that the range of this handsome guinea fowl is more extensive than previously considered. It is found only in the low, eastern thorn bush plains in Tanganyika Territory from the Pangani River northwards. In Kenya Colony it occurs from the Tanganyika border (the Kilimanjaro district west to the Ukamba country) then north (keeping to the east of the high plateau of the Kikuyu districts), to the Northern Guaso Nyiro, and then west to the Karamojo country (north of Mount Elgon), eastern Uganda, and east through Jubaland to southern Somaliland and southern Gallaland. The Lake Stefanie specimen serves to connect the Gallaland part of the range with eastern Uganda, and suggests that this bird will be found to inhabit the Turkana and Rendili country as well. This species is absolutely confined to the semiarid thorn-bush country of tropical east Africa.

This genus agrees with *Numida* in that the postnatal molt is incomplete, the dorsum of the head retaining the down. It differs, however, in that it goes through only four plumages, the subadult stage being omitted. The juvenal plumage is not represented in the series available, but Van Someren[1] writes that it is largely barred above with black, buff, and rufous; the primaries are brownish black with bars of buff on their outer webs and tips, while the secondaries are darker, barred with buffy, freckled with blackish, and apically tinged with rufous; the breast feathers are blackish, barred with buffy white; lower breast with a blue wash; abdomen grayish.

The immature plumage is not particularly distinct as it combines to some extent the characters of the preceding and succeeding stages. The head, chin, and upper throat are still covered (though sparsely) with down, the upper parts otherwise are practically as in the adult, but the feathers of the back and interscapulars have wide brownish tips, which wear off, leaving the feathers as in the adult. The mantle and breast have the long hackle feathers with white shaft stripes, the abdomen and rest of the underparts are as in the adult stage.

One of the females from the Endoto Mountains is in the immature plumage. It has the breast as in the juvenal birds; that is, barred black and buffy white, but amongst these feathers are numbers of the long hackles. These last are of considerable interest in that they indicate that the broad white shaft stripes develop by a longitudinal stretching and fusing of white transverse bars as the feathers become longer. Several of them have a terminal transverse widening which really amounts to nothing less than a transverse bar, and a short distance proximal to these is a pair of lateral, pointed outgrowths of the shaft stripe, suggesting more fully absorbed bars. Furthermore, in fresh hackles the shaft stripe does not extend to the tips of the feathers but is ended subterminally by a black bar which, in turn, is apically margined with white, the last forming a true, distinct, though somewhat desiccated white bar. The tips of the feathers wear off down to, and including, the transverse terminations of the shaft stripes. This condition is also true of the mantle feathers.

This immature bird has the outer edge of the outer secondaries more bluish, less purplish, than in adult birds.

The birds collected by Mearns are smaller than examples from farther south (short distance south of the Guaso Nyiro). The northern specimens have wings of 300-302 (male) and 280 (female) as against 309-320 (male) and 291 (female) in the southern ones. Southern birds also have slightly smaller bills, as follows: Northern males, 26-30 millimeters; southern males, 31-31.5 millimeters; northern females, 27.5 millimeters; southern females, 28.5 millimeters.

This handsome fowl was noted at several localities during the course of the expedition: Boran, lower Chaffa village, June 23. 1 seen; Chaffa, June 24–25, several feathers found; dry river south of Hor, July 1–2 feathers found; Indunumara Mountains, July 13, 20 birds seen; plains at base and south of Endoto Mountains, July 19–24, 75 noted; Le-se-dun, July 26, 50 birds; between 27 and 45 miles south of Malele, July 30, 50 seen; N. Guaso Nyiro River, July 31 to August 3, 50 birds.

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[1] Journ. E. Afr. and Uganda Nat. Hist. Soc., 1925, pp. 18–19.

Erlanger[2] found it very numerous in the thornbush tangles of southern Somaliland, often in large flocks.

Order GRUIFORMES

Family GRUIDAE

BALEARICA REGULORUM GIBBERICEPS Reichenow

Balearica gibbericeps Reichenow, Journ. f. Ornith., 1892, p. 126: Lake Jipe.

No specimens of the east African crowned crane were collected, but Mearns saw 10 of these beautiful birds on the Lekiundu River, August 4–8.

ANTHROPOIDES VIRGO (Linnaeus)

Ardea virgo Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 141, 1758: "in oriente."

The demoiselle crane was seen in several places along the Hawash River, usually feeding in cultivated fields. "It is not very shy; in pairs or occasionally in large flocks." (January 26 to February 13, E. A. Mearns.)

No specimens were collected.

This crane is only a winter visitor in Ethiopia and appears not to occur in southern Shoa and southern Gallaland at all.

GRUS GRUS GRUS (Linnaeus)

Ardea grus Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 141, 1758: Europe; Africa; restricted type locality, Sweden.

Specimens collected:

One adult unsexed, Alatu; Ethiopia, January 15, 1912.

As would be expected from the locality, this bird is of the typical subspecies. The European crane does not occur south of Ethiopia in its winter range, and apparently is not particularly common even in that country.

Judging by size, the specimen is a male, and a rather large one at that, being about as big as the maximum measurements given by Hartert;[3] wing, 620 millimeters.

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[2] Journ. f. Ornith., 1905, p. 139.

[3] Vög. pal. Fauna, p. 1814.

Family RALLIDAE

ROUGETIUS ROUGETII (Guérin)

Rallus rougetii GUÉRIN, Rev. Zool.. 1843, p. 322: Ethiopia.

Specimens collected:

Male, Aletta, Sidamo, Ethiopia, March 8, 1912.

Soft parts: Iris, brownish red; bill, dull red; legs and feet, reddish olive.

According to Neumann[4] the sexes are alike in plumage, but younger birds are somewhat lighter than older ones. From this it would seem that the type specimen (now in the Museum of Comparative Zoölogy) was not as fully adult as the one collected by Mearns or another adult from Debra Markos, 100 miles south of Lake Tsana (Cheesman collection). Even allowing for fading, as the type was mounted and on exhibition for many years, it is lighter, particularly on the sides of the head, than the other two specimens.

The bird from Debra Markos is darker, deeper reddish on the underparts than the Aletta specimen, but the latter is darker, more fuscous, less brownish on the back and rump than the former.

Cheesman's bird extends the known range of this rail through the Gojjam district. The nearest point to the south where it has been noted is Adis Abeba, where Erlanger[5] heard it calling on several occasions, but was unable to procure a specimen. Lovat, however, did obtain this rail at Gedda, Antotto, not far from Adis Abeba. To the northeast of the Tsana district the nearest records are Rüppell's bird from Semien, Von Heuglin's specimen from Wogara, eastern Tigre district, while Ashangi Lake[6] is the nearest point to the east. According to Sclater[7] the species is confined to the highlands of Ethiopia and Shoa, but Reichenow[8] lists a specimen taken by Antinori at Lobeida, which, according to Reichenow[9] is in Kordofan. Anglo-Egyptian Sudan. The species is not included in Sclater and Mackworth-Praed's list of Sudanese birds. Its occurrence in the Sudan is doubtful.

The colored figure (pl. 46) in Rüppell's "Syst. Uebersicht der Vögel Nord-Ost-Afrikas" is more rosy, less chestnut, below than any of the specimens examined.

The single specimen collected is smaller than the type or the bird from Debra Markos. The measurements are as follows:

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[4] Journ. f. Ornith., 1904, pp. 334–335.

[5] Idem, 1905, p. 86.

[6] Blanford, Geol. and Zool. Abyss., 1870, p. 434.

[7] Syst. Avium Ethiop., 1924, p. 101.

[8] Vög. Afrikas, vol. 1, p. 275.

[9] Idem, Atlas, 1902.

Locality	Sex	Wing	Tail	Culmen
"Abyssinia" (type)		132. 5	62. 5	33. 0
Ethiopia:				
Aletta	♂	130. 0	52. 0	30. 0
Debra Markos	♂			33. 5

Neumann [10] found a nest with eight eggs of this rail in the Kollu district on September 23. This is all the data I know of with regard to the breeding season of this bird.

LIMNOCORAX FLAVIROSTRA (Swainson)

Gallinula flavirostra Swainson, Bds. West Afr., vol. 2, p. 244, pl. 28, 1837: Senegal.

The black crake was observed in several localities in Kenya Colony, although no specimens were taken. Meru swamp, August 9, 4 birds; Thika River, August 27, 1 seen; west of Ithanga Hills, August 28, 2 noted; Athi River, August 30 to September 1, 5 birds seen.

GALLINULA CHLOROPUS BRACHYPTERA (Brehm)

Stagnicola brachyptera Brehm, Vogelf. p. 331, 1855: Middle Africa.

Specimens collected:

Male, Hor, Kenya Colony, June 26, 1912.

The race *brachyptera* is very close to the East Indian *orientalis*, but is slightly larger (average) and has longer toes. In studying this bird I have assembled a series of 8 adults of the present form, and have seen specimens (216 in all) of 13 of the 16 supposed subspecies, the only ones not examined being *guami*, *centralis*, and *portoricensis*. The last two are probably not distinct anyway. However, only the four races known to occur in Africa need enter into the present study. These are:

1. *G. c. chloropus.*—Northern Africa (Atlas Mountains and Egypt), south to the Sudan and Arabia (but not Eritrea, Ethiopia, or Somaliland). This form is characterized by the olivaceous-brown edges of the upper wing coverts which give the folded wing a brownish appearance from above, and by its size. Wings, male 173–190, female 163.5–176 millimeters.

2. *G. c. brachyptera.*—The whole of Africa south of the Sahara and the Egyptian (not Anglo-Egyptian) Sudan. This form does not occur in Arabia. It is characterized by the bluish-slate color of the upper wing coverts; size smaller than *chloropus;* wings, male 156–171; female, 153–154 millimeters.

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[10] Journ. f. Ornith., 1906, p. 298.

3. *G. c. pyrrhorrhoa.*—Madagascar, Mauritius, and Réunion. Characterized by having the under tail coverts deep buff, while the other races have these feathers white or only slightly tinged with buff.

4. *G. c. seychellarum.*—Seychelle Islands (at least Ile Aride). Characterized by having the under tail coverts buffy, almost as much as in *pyrrhorrhoa* and the upper wing coverts more brownish than in *brachyptera* and wings slightly shorter (150–170 millimeters). This form is recognized by Sclater[11] who gives as its range the Seychelle Islands. However in his review of *Gallinula chloropus*[12] Hartert writes that birds from some of the islands are like African ones (*brachyptera*) and expresses some doubt as to the possibility of a small island like Ile Aride having a form distinct from that of the rest of the Seychelles. Later[13] he includes all the islands in the range of the race, but remarks that the color characters apply particularly to specimens from Ile Aride. Series from the Seychelles some day will show whether this race is valid or not. In the Museum of Comparative Zoölogy there is a specimen (No. 11292) of *seychellarum* collected by Layard (and labeled "South Africa," but which probably came from the Seychelles). This bird agrees with Hartert's description, but is even browner above than his account would indicate.

C. H. B. Grant[14] has given an extended, detailed account of the plumages and molts of the typical race of this moorhen. He has shown that the birds molt all the remiges at once, as do many ducks, some rails, swans, and anhingas. In the extensive series in the Museum of Comparative Zoölogy are specimens of the Madagascan race, *pyrrhorrhoa*, and of the North American form *cachinnans*, in which all the remiges are growing in simultaneously, showing that this drastic, sudden replacement of all the flight feathers is not confined to the typical subspecies, but is probably common to all the forms. It is rather surprising that it has not been recorded for the North American bird, although much has been written of this form.[15] Bent does not mention it in his detailed account of *cachinnans*.

Grant's account of plumage variations in *chloropus* applies equally well to *brachyptera*. The number and width of the white stripes on the flanks, the amount of whitish on the middle of the abdomen, and the whiteness of the under tail coverts vary without respect to sex, age, or season, although it is true that the white flank stripes become wider on males than on females, but only in extreme cases. The series before me shows considerable variation in the amount of yellow on the bill; the two extremes are, (1) yellow confined to the tip (7 millimeters) of both maxilla and mandible, (2) yellow confined to tip (9 millimeters) of maxilla and extending to lower base of mandible, only the upper part of the mandibular base being red. The under wing coverts also vary in that some have wide whitish margins, while others have practically no lighter edges.

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[11] Syst. Avium Ethiop., 1924, p. 108.

[12] Nov. Zool., vol. 24, 1917, pp. 267–270.

[13] Vög. pal. Fauna, p. 1843, 1921.

[14] Ibis, 1914, pp. 298–304.

[15] Bull. 135, U. S. Nat. Mus., 1926, pp. 351–352.

In Kenya Colony the breeding season is during late May and June (two specimens, Kaimosi) and probably extends much later, as Van Someren [16] writes that he took a bird in December which was just beginning to renew the wing feathers, a postbreeding season activity.

Besides the bird collected at Hor, Mearns saw 12 individuals at Meru and Kilindini, August 9–10, and 1 at the Athi River August 31.

Family OTIDIDAE

CHORIOTIS ARABS ARABS (Linnaeus)

Otis arabs LINNAEUS, Syst. Nat., ed. 10, vol. 1, p. 154, 1758: "in oriente."

Specimens collected:

Female, Camp No. 1, Errer, Ethiopia, December 13, 1911.
Male, Tollo, Ethiopia, December 15, 1911.

The male (sexed by native collector) is much darker brown above than the female.

According to Sclater [17] the birds living in the Lake Chad region east to the Nile Valley are of a different race, *stieberi* Neumann. This is said to differ from *arabs* in that the crown is yellow and black in the western *stieberi* and gray and black in typical eastern birds. I have seen no western Sudanese examples and can not pass judgment on *stieberi*. A bird from Gabardi (near Roseires), Blue Nile, Sudan, is typical *arabs*. It differs from the two Abyssinian specimens in the following particular: The barring of the hind neck becomes finer, almost amounting to vermiculations posteriorly in the two latter, while in the former it remains coarse and large for the entire length of the neck. The Sudanese bird is also smaller than those from Ethiopia.

Neumann [18] gives the range of *arabs* as western and southern Arabia and the coastal lands of the Red Sea from Bogosland to northern Somaliland.

Sclater [17] gives Kassala as the western limit of its range, based on the records given by Sclater and Mackworth-Praed,[19] who list *arabs* from Gedaref and Sinkat, about 150 miles north of Gabardi. The Blue Nile specimen considerably extends the known range of the form, and indicates that the typical race occurs across northern Ethiopia and in the Sudanese provinces of Kassala and Sennar.

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[16] Nov. Zool., vol. 29, 1922, p. 23.
[17] Syst. Avium Ethiop., 1924, p. 112.
[18] Journ. f. Ornith., 1907, p. 307.
[19] Ibis, 1920, p. 797.

The measurements of the specimens examined are:

Locality	Sex	Wing	Tail	Culmen	Tarsus
Sudan, Gabardi	♀	618	317	91	178
Ethiopia:					
Tollo	♂	633	328	93	180
Camp 1, Errer	♀	641	345	87	176

The easternmost record for *stieberi* is a bird collected at Lake No, Bahr-el-Ghazel.

This is all written on the assumption that the two races are distinct. However, Lynes[20] writes that he can not detect any but individual differences between Darfur and Moroccan (*stieberi*) specimens and others from Arabia (*arabs*), and that the so-called racial characters depend on staining or on age of the feathers, and have no geographical significance.

Without examining material from the western Sudan, I hesitate to depart from the check list arrangement and prefer to use a trinomial for the Abyssinian birds.

CHORIOTIS KORI STRUTHIUNCULUS (Neumann)

Otis kori struthiunculus NEUMANN, Journ. f. Ornith., 1907, p. 306: Lake Zwai, Ethiopia.

Specimens collected:

Male (head and neck only), Gada Bourca, Ethiopia, December 24, 1911.

Male (head and neck only), Hawash River, Ethiopia, February 6, 1912.

To look at a museum series of these birds, including specimens of different ages, the size variations are so great that one gets the impression of two species, a larger and a smaller one, "lumped" together under one name. However, age differences (after the assumption of adult plumage) explain this enormous diversity of size. In an allied species (*C. arabs*) Lynes[21] records that the weight varies from 22 pounds for an old male to 7¾ pounds for an immature but fully grown female. The differences in *kori* are at least as great.

Neumann[22] divided *kori* into two races: Typical southern birds (south of the Zambesi, in the high veldt) have the lores and superciliaries spotted black and white; the northern form *struthiunculus* (northeast and east Africa; from the Harrar and Hawash districts of Ethiopia, and the Danakil coast of Eritrea, south to central Tanganyika Territory) has the lores and superciliaries pure white with no black spots.

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[20] Ibis, 1925, p. 553.

[21] Idem, 1925, p. 553.

[22] Journ. f. Ornith., 1907, p. 306.

In the same publication Neumann described a new species, *adolfi-friederici*, said to differ from *kori* in having a large black patch with whitish streaks running lengthwise through it on the throat; the basal half of these feathers being pure white without barrings. This species according to Sclater [23] is known only from the type, a head and neck, and is considered a doubtful species. It is in reality even less than that, nothing but an occasional melanism that crops out once in a while throughout the range of *struthiunculus*. The bird collected at the Hawash River is exactly like the description of *adolfi-friederici* and so is a specimen in Museum of Comparative Zoölogy (No. 56341) from the plains north of Nyeri, Kenya Colony. These three (the type from Mara River, east coast of Lake Victoria, and the two just mentioned) indicate that *adolfi-friederici* appears here and there together with *struthiunculus*, throughout the range of the latter, with which it is undoubtedly identical. The barring on the neck is slightly heavier, the white bars relatively wider in these birds than in typical *struthiunculus*, but some specimens of the latter have this character as in the so-called *adolfi-friederici*.

The range of *struthiunculus* is more extensive than indicated by Sclater,[23] who writes it as "Southern Abyssinia south to Kenya Colony and Somaliland." Neumann [22] gives it as south to middle Tanganyika Territory, in the coastal districts only. Recently, it has been found to occur inland as well in Tanganyika Territory. Thus, Schuster [24] saw it at Singida and near Shinyanga (northeastern Unyamwezi district), and Loveridge collected a specimen (now in the Museum of Comparative Zoölogy) at Sagayo, Mwanza, and saw another at Mlewa's (15 miles north of Singida).

Older birds have the lesser upper wing coverts more grayish, less brownish than younger adults, and have the whitish markings on the inner webs of the primaries more restricted in the outer remiges. The outermost primary is usually not marked or mottled with white; in large adults the next one is almost entirely unmarked, except a little on the basal part of the inner web, while in smaller adults this feather is definitely but incompletely banded with white on the proximal three-fifths of the inner web.

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[22] Journ. f. Ornith., 1907, p. 306.

[23] Syst. Avium Ethiop., 1924, p. 112.

[24] Journ. f. Ornith., 1926, p. 146.

The male in "*adolfi-friederici*" plumage from the Hawash River has a couple of the feathers of the crown yellow, instead of gray, heavily mottled with black. This lends indirect support to Lynes' contention regarding the races of *Choriotis arabs*.[25]

The birds vary so greatly in size that comparative measurements mean little. The largest adult bird (sexed as a female) measures as follows: Wing, 786; tail, 378; culmen, 137; tarsus, 230 millimeters. This is larger than the maximum given by Reichenow[26] except as regards the tail. The largest figures given by Erlanger[27] are for a male; wing, 765; tail, 385; bill, 108 millimeters.

Mearns found this bird to be not very scarce in the country traversed from Errer to Gada Bourca. One of the birds shot, a very large male, weighed about 25 pounds.

Other localities where this species was met with are as follows: The Abaya Lakes, March 18–26, 17 birds seen; Gato River, March 29 to May 17, scarce, only 1 noted; Turturo, June 15–17, 4 seen; Anole, June 17, 2 birds; Wobok, June 18, 2; Indunumara Mountains, July 13–18, 6 seen; the plains at the base and south of the Endoto Mountains, July 19–20, noted; 18 miles south of Malele, July 28, 2 birds; Northern Guaso Nyiro River, July 31 to August 3, 8 seen; Lekiundu River, August 4–8, 7; Meru, August 9, 2 birds; Athi River, August 30 to September 1, 5 noted.

Of this bird, Mearns noted that it—

> * * * usually flies in pairs, often two pairs together, and occasionally three birds. Its cry is constantly heard when they are about; but they always appear about the camp at morning and evening. They utter a loud *bah-kah-ka*, frequently repeated, both when walking in the grass and when flying. During the middle hours of the day they usually are absent and can not be found in the grass. They frequent the hills where the grass is not too heavy for running freely about, but when flushed and shot at, often fly to low places where the grass and bushes give better cover, and lie quite close. When flushed they utter their loud *bah-kah-ka*, the first two syllables slowly drawn out with a nasal quality. I have seen no young ones. When I shot a female, the male remained about the place for two days, constantly flying about and calling, until I shot it for food.

EUPODOTIS CANICOLLIS SOMALIENSIS (Erlanger)

Otis canicollis somaliensis ERLANGER, Journ. f. Ornith, 1905, p. 82: Metaker, Ennia-Gallaland (see Hilgert, Cat. Coll. Erl., p. 436).

Specimens collected:

Male, Sadi Malka, Ethiopia, February 2, 1912.
Female, Hawash River, Ethiopia, February 7, 1912.
Male, Bodessa, Ethiopia, May 23, 1912.
Male, Bodessa, Ethiopia, May 24, 1912.
Male, Lekiundu River, Kenya Colony, August 7, 1912.

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[25] See p. 143.

[26] Vög. Afr., vol. 1, p. 242.

[27] Journ. f. Ornith., 1905, p. 80.

Soft parts: (Male) iris, grayish white, finely dotted with brown next to the pupil; bill, mainly flesh color, horn color at the tip of the maxilla, pale brown at the base of the maxilla, and brownish black subterminally above; bare tibiae and feet, flesh color, tinged with gray on the feet; claws, pale brown.

The nomenclature of the two races of the white-bellied knorhaan has been much upset due to the fact that the type of the southern form *canicollis* came from the northern part of its range, near where *somaliensis* occurs, and various authors have come to different conclusions as to which race was the typical one. Erlanger[28] first noted that there were two races, a northern, rufescent one, and a southern, paler form. He correctly ascribed the type of *canicollis* (Berdera, east of Juba River) to the southern bird and named the northern one *somaliensis*. Reichenow[29] then wrote that the type of *canicollis* belonged to the northern form and that consequently *somaliensis* was a synonym. He then named the southern birds *erlangeri* (Machakos, Kenya Colony to Iringa, Uhehe district, Tanganyika Territory). Neumann[30] corrected Reichenow's error and showed that *erlangeri* was a synonym of *canicollis*, while *somaliensis* was distinct. Still the names continued to be shifted around, as Lönnberg[31] overlooked Neumann's paper and called a northern bird (from Luazomela River, Kenya Colony) *canicollis*. In 1914 Zedlitz[32] reviewed the nomenclature of this bustard and once more straightened it out. Sclater[33] following Zedlitz, has correctly stated the forms, and it is to be hoped that workers from now on will use Sclater's list as a guide in this connection.

Part of the confusion that has existed about these races is due to the fact that Berdera was mistaken for Berbera, a locality nearly 600 miles to the north of the former.

In Ethiopia, *somaliensis* is known to occur in the Tigre, Danakil, Hawash, Harrar, Galla, Arussi, and Shoa districts. In Kenya Colony it ranges throughout the drier inland districts south to the Lekiundu, Guaso Nyiro, Luazomela, and Amala Rivers, while typical *canicollis* occurs in the southern and coastal parts. In Somaliland the northern form appears to range throughout from Eritrea to southern Italian Somaliland.

The plumage of the adult female seems to be poorly known. Reichenow[34] raises the question as to whether the sexes are alike or if adult females are like young birds. Zedlitz[32] writes that the sexes are not alike, but does not say in what particulars they differ. Two females examined differ from the males in the following respects. The under side of the neck and the breast are pale tawny-avellaneous, the feathers finely vermiculated with blackish; chin and upper throat, white, the latter with a "spotty," partly concealed black anchor mark, similar in shape, but smaller than that in the male, the spotted appearance due to the white tips of the feathers; lower breast, pale avellaneous but without black vermiculations; abdomen, sides, flanks, and thighs, whitish, in one specimen tinged with avellaneous, becoming darker anteriorly and merging into the color of the breast; under tail coverts, white; under wing coverts, whitish, the lesser ones gray, the axillars black; forehead, dark brownish abundantly flecked with tawny; crown, similar but the tawny flecks replaced by fine buffy-whitish dots; occiput, lighter brown, dotted with buffy white; a short black transverse band behind the head on the nape; dorsum of neck, bluish gray as in males; lores and broad superciliaries, buffy white, dorsally edged with a line of black spots and streaks, a band from the bill to and under the eye, cinnamon tawny mixed with black; auriculars, tawny; rest of upper parts as in male, but wings and back more banded with buffy white and fuscous; remiges and rectrices as in males.

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[28] Journ. f. Ornith., 1905, p. 84.

[29] Vög. Afrikas, vol. 3, Nachtrag, p. 802.

[30] Journ. f. Ornith., 1907, p. 307.

[31] Kungl. Sv. Vet. Akad. Handlgr., vol. 47, 1911, p. 39.

[32] Journ. f. Ornith., vol. 62, pp. 633–634.

[33] Syst. Avium Ethiop., 1924, p. 114.

[34] Vög. Afrikas, vol. 1, p. 250.

One of the adult males (Lekiundu River, Kenya Colony) is remarkable in that the second, fourth, fifth, and seventh primaries (counting from the outside) have white patches on the outer webs. The second not only has the basal white area extending across the outer web, but also has a broad subterminal white band; the fourth has a white band across its middle; the fifth has two such bands, one near the middle of its length, the other subterminal.

Five adult males present the following measurements: Wing, 307–323; tail, 140–155; culmen from base, 38–41.5 millimeters. Two males of typical *canicollis:* Wing, 319–329; tail, 154–173; culmen from base, 38–40 millimeters. Two adult females of *somaliensis:* Wing, 300–307; tail, 138–140; culmen from base, 35.5–41.

According to Erlanger[35] the breeding season in Ennia-Gallaland is in May. He obtained a clutch of two eggs at Dagaga on May 25.

The white-bellied knorhaan was seen in the following localities other than those in which specimens were taken: Er-re-re, July 25, 4 seen; Malele and district to the south of Malele, July 28–30, 10 birds; the Northern Guaso Nyiro River, July 31 to August 3, 24 seen; Lekiundu River, August 4–8, 40 noted; Meru, August 9, 10 seen; Tana River, August 17–23, 14 birds; Thika River, August 23–27, 5 seen.

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[35] Journ. f. Ornith., 1905, p. 84.

LOPHOTIS RUFICRISTA GINDIANA (Oustalet)

Eupodotis gindiana Oustalet, Bull. Soc. Philom., ser. 7, vol. 7. p. 164, 1881: "East Africa between Somaliland and Zanzibar."

Specimens collected:

Two male adults, three female adults, one female juvenal, Bodessa, Ethiopia, May 22–31, 1912.

Male, Wobok, Ethiopia, June 18, 1912.

Male, subadult, Lekiundu River, Kenya Colony, August 7, 1912.

Soft parts: Iris, yellow or brownish yellow; bill, brownish black on maxilla and extreme tip of mandible; rest of mandible and commissural margin of maxilla, grayish horn color; bare tibiae and feet, grayish white tinged with olive on toes; claws, brownish black.

Lophotis ruficrista ranges from the valley of the Orange River in South Africa throughout southern Rhodesia and east Africa to central Ethiopia, northern Somaliland and the Anglo-Egyptian Sudan west through Kordofan and Darfur. Roughly, it may be said to range north to the equatorial rain forest belt, east of it, and then in the Sudan it turns west again, north of the forested region. Throughout its range it has become differentiated into four races, one of which (*savilei*) may be even specifically distinct. These races are as follows:

1. *Lophotis ruficrista ruficrista.*—South Africa, Rhodesia, and Angola, from the valley of the Orange River north to Benguella and to the valleys of the Zambesi and its affluents. This form is characterized by large size, wings (male) 270–290, (female) 260–262 millimeters; the tuft on the nape in the male rufous vinous; lores and superciliaries, pale brown.

2. *Lophotis ruficrista gindiana.*—Tanganyika Territory from the Pangani River north through Kenya Colony and northeastern Uganda (Turkana and Turkwell districts) to the Abaya Lakes, Arussi, Galla, and Shoa districts of Ethiopia, and to southern Italian Somaliland. Characterized by having the tuft of feathers on the nape in the male paler than in *ruficrista*, pale rufous buff, whitish tawny at the base; the lores and superciliaries slightly more orange than in the typical form; averages smaller, wing (male) 255–272, (female) 257–275 millimeters.

3. *Lophotis ruficrista hilgerti.*—Northern and central Somaliland. Similar to *gindiana* but the black marks on the back more incised with yellowish-brown marks, tending to make the upper parts more uniform, more vermiculated, less heavily splotched in appearance.

4. *Lophotis ruficrista savilei.*—Sudan, provinces of Darfur and the western part of Kordofan. Easily told by its small size; the smallest

of all the forms of *Lophotis ruficrista*, wing (male) 239–257 millimeters.[36] This form is certainly the most distinct and may be a species and not a race. Both Lynes and Sclater give it full specific standing, but it is so obviously related to *ruficrista* that it seems more natural to consider it a race of that species. I have, however, seen no material of *savilei* (the only race not available for the present study).

The subadult male from Lekiundu River, Kenya Colony, has the breast like the female but the black of the abdomen is invading the white of the upper abdomen and replacing the white; the median black line in the throat is beginning to appear; the top of head, neck, and nape are as in the female; the back is more rufescent and has, on the average, larger black markings than in any of the adults.

Another male (from Bodessa, U.S.N.M. No. 243330) is in full adult plumage, except for the top of the head which is still like the female, indicating that this region is the last to molt. The nuchal tufts are well developed; the breast is light bluish gray, except laterally where it is much mottled with buffy and brownish. No black midthroat line is present, however.

In all plumages the upper parts become darker, less rufescent, with wear as the lighter edges of the feathers disappear with abrasion, leaving the dark centers more exposed and prominent.

The juvenal female from Bodessa is in the last stages of the postnatal molt. Inasmuch as this plumage appears to be undescribed, I append a detailed account of it.

Forehead and lores ochraceous tawny, white superiorly, the median line of the forehead, crown, and anterior part of the occiput black, the feathers tipped with ochraceous tawny; posterior part of occiput similar but the tips lighter, more whitish, and the feathers with a large, visible whitish spot on each web at about the middle of the feather, these spots and the terminal whitish buff tips giving a barred appearance to the hind part of the occiput; nape light ochraceous buff with a white ring; scapulars, interscapulars, and back much mottled with black on a rufescent wood brown background, the feathers with a wide black centrally indented shaft streak, and tipped with bright sudan brown subterminally bordered with white, the brown tips becoming slightly lighter, more ochraceous anteriorly; lesser upper wing coverts like the scapulars but lighter, with the brown tips more ochraceous tawny, the white subterminal bands broader, the black shaft streaks broken up, merging with the vermiculations on the vexilla; the middle coverts with the ground color white instead of pale wood brown or rufous buff as in the lesser ones;

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[36] See Lynes, Ibis, 1925, pp. 557–559.

the greater wing coverts rufous wood brown, mottled with black on the terminal half, subterminally broadly banded with black, and broadly tipped with dull ochraceous buff; primaries and outermost secondaries pale vinaceous buff banded with two narrow black bands very broadly banded subterminally with black, tipped with dull ochraceous buff; inner secondaries, pale vinaceous buff, heavily and abundantly vermiculated with black, with no black bands, terminally tipped with sudan brown, subterminally bordered with white; the distal parts of the feathers externally narrowly edged with white or very light pinkish buff; lower back and rump, dark grayish-olive brown, narrowly and irregularly barred with blackish, and broadly tipped with sudan brown; upper tail coverts and central rectrices, very pale vinaceous fawn color exceedingly heavily and abundantly vermiculated and mottled with black, making the feathers look quite blackish, much darker than rest of upper parts; and narrowly tipped with white and then brown terminally; lateral rectrices similar but duskier basally, but solid black for the distal third to half; very narrowly tipped with white and sudan brown; cheeks and auriculars, ochraceous tawny, lower sides of face and sides of throat, white; chin, white; middle of throat, buffy to pale ochraceous buff with a narrow median whitish line bordered for its posterior part by blackish brown; lower throat and upper breast, pale wood brown, the feathers broadly tipped with black, white, and, terminally, ochraceous tawny; lower breast, whitish; abdomen, flanks, and under tail coverts, black very narrowly tipped with pale ochraceous; iris, brownish yellow; bill, olive black above, yellowish green below and along commissure; feet, gray; claws, olive brown.

At Bodessa, Mearns made the following entry in his notes about this bird:

> A noisy bird but silent in flight. Frequents the long trail on a long dividing crest leading south. Here its tracks may always be seen. I have shot two in the trail along which they run, singly or in pairs, for miles. When the fresh tracks cease in the dusty trail, I send a boy out on each side in the grass, and the birds are soon flushed and shot on the wing. They are delicious table birds. Usually on high ridges, seldom flushed from the longer grass of the slopes below. On May 31, my boy brought me a half-grown young one which he had caught in the grass when hunting.

The list of localities in which this bird was noted is as follows: Abaya Lakes, May 18–19, 50 birds; Bodessa, June 6, 2 seen; Tertale, June 7–12, 30 seen; El Ade, June 12, 2; Turturo, June 15–17, 2 birds; near Saru, June 19, 4; Yebo, June 20, 10 seen; Karsa Barecha, June 21, 4 birds; Malata, June 22, 2; Chaffa villages, June 23–24, 8 seen; Hor, June 26–30, 4 noted; dry river south of Hor, July 1–2, 6 birds; Dussia, July 3–4, 6 seen.

LISSOTIS MELANOGASTER (Rüppell)

Otis melanogaster Rüppell, N. Wirbelth. Vög., p. 16, pl. 7, 1835: Lake Tsana, Ethiopia.

When we consider the abundance of records of this bird in Mearns' diary, and the fact that he knew the species from his experience with it on the Roosevelt expedition, the absence of specimens is hard to understand. I find the following entries which apparently refer to *Lissotis melanogaster:* Loco and Gidabo River, March 15–17, 2 seen; Abaya Lakes, March 18–23, 14 birds; Bodessa and Sagon River, May 19 to June 6, 52 noted; Anole, June 17, 4 seen; Wobok, June 18, 2; near Saru, June 19, 4; Yebo, June 20, 4 birds; Karsa Barecha, June 21, 10 seen; Malata, June 22, 10; Chaffa villages, June 23–24, 10; southeast of Lake Rudolf, July 12, 2 seen; Indunumara Mountains, July 13–18, 90 birds; plains at base and south of Endoto Mountains, July 19–24, 54 birds; Er-re-re, July 25, 20 seen; Le-se-dun, July 26, 20 seen; Malele and the district to the south for 45 miles, July 27–30, 70 birds noted; Northern Guaso Nyiro River, July 31 to August 3, 35; Lekiundu River, August 4–8, 40 birds; Meru, August 9, 4 seen; Tana River, August 18–23, 10 birds.

Order CHARADRIIFORMES

Family JACANIDAE

ACTOPHILORNIS AFRICANUS (Gmelin)

Parra africana Gmelin, Syst. Nat., vol. 1, pt. 2, p. 709, 1789. Africa: restricted type locality, Ethiopia (Grant, Ibis, 1915, p. 59).

Specimens collected:

Male immature, female subadult, Gidabo River, Ethiopia, March 17, 1912.

Male adult, unsexed immature, near Lake Abaya, Ethiopia, March 17, 1912.

Oberholser[37] has shown that *Actophilus* Oberholser is preoccupied by *Actophilus* Agassiz, and proposes the new generic appellation here used.

Of these four specimens one is in perfect adult plumage with black upper sides of head and neck and deep chestnut body; one has the upper side of the head and neck sepia, the back Dresden brown, and the underparts white, except the yellow chest collar, with a sprinkling of chestnut feathers coming in with the molt; and the remaining two are intermediate, having acquired much of the chestnut body plumage. (E. A. Mearns.)

The sequence of plumages and molts in this species has never been described. The present account is based on rather insufficient material, but may serve to give a general picture of what takes place.

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[37] Proc. Biol. Soc. Wash., vol. 38, 1925, p. 90.

1. *Natal down.*—Not seen or found in literature, but probably white on the underparts; dark sepia on the top of head and back of neck; rufous brown on rest of upperparts. (I suggest this because of the great similarity in juvenal plumages between the species of *Actophilornis* and *Jacana;* the natal down of the latter being as suggested as probably like that of the former.)

2. *Juvenal plumage.*—Acquired by a complete postnatal molt. Entire underparts white except the sides and flanks which are reddish brown mixed with white; top of head and back of neck dark fuscous brown; a wide stripe of the same color from the bill through the eyes, separated from the crown by a superciliary stripe which is whitish anteriorly and yellowish brown posteriorly, Reichenow [38] says that the superciliaries are white; Grote,[39] writes yellowish brown; sides of mantle and posterior part of neck yellowish, but not as bright as in adults; back, scapulars, and interscapulars, light cinnamon brown, this color being, however, more or less confined to the tips and edges of the feathers, which are otherwise oily brownish olive; lesser and middle wing coverts bright liver brown; greater coverts olive fuscous, externally edged with dull liver brown tipped with whitish; remiges fuscous with an oily greenish sheen, the inner secondaries dull cinnamon brown terminally; rump and upper tail coverts bright, deep liver brown, fuscous basally; central rectrices glossy raw umber with indistinct transverse striations, lateral rectrices raw umber on the inner webs; rufous liver brown on the outer ones which are externally edged with raw umber; under wing coverts, very deep liver brown; iris, brown; feet, bill, and frontal shield (which is very small), dusky olive gray.

This plumage is retained only a short time, when it is partly replaced by an incomplete postjuvenal molt involving the feathers of the crown, nape, hind neck, mantle, back, scapulars and interscapulars, and of the upper breast. This molt gives rise to the—

3. *Immature plumage*, which is worn until the bird is nearly two years old (about 20 months). It is similar to the juvenal plumage, but the breast is tinged with yellowish like the sides of the lower neck; the back is dark, rich, liver brown, with an occasional olivaceous juvenal feather persisting, the crown, nape, and hind neck are mostly deep black, but somewhat mixed with brownish feathers retained from the preceding plumage; the stripe from the bill through the eye is black, and the superciliaries are wholly white and slightly narrower than in juvenal birds.

When the bird is nearly two years old it undergoes another molt, which seems (from totally inadequate material) to be complete, and which results in the—

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[38] Vög. Afr., vol. 1, p. 268.

[39] Journ. f. Ornith., 1912, p. 509.

4. *Adult plumage*, which is well known and needs no redescription. With increase in age the frontal shield becomes larger and extends not only caudally but also laterally, and in old birds entirely does away with the superciliary stripes by its lateral growth.

The molt which ushers in the adult plumage is apparently a prolonged process, beginning with the wings and tail and then extending to the body. At least, as far as the material examined goes, the new remiges are fully grown before the white lower breast and abdomen undergo any considerable amount of molt. The molt in the latter regions is irregular and patchy, specimens taken in this stage presenting a pied, blotchy ventral expanse of white and deep, rich, reddish brown. Adults have lead colored feet and bluish black irides, but just when, or how gradually, the change from the juvenal condition comes I can not say. When the superciliaries begin to disappear, the process begins at the caudal end. One of Mearns' specimens has only the anterior half of the superciliaries left, ending at the front margin of the eye.

The discovery that the adult plumage is not attained until the second year is not new at this point. As long ago as 1906 Sclater [40] suggested this as a probability, and even six years earlier Boyd Alexander [41] found birds in immature plumage together with breeding adults on the Zambezi and wrote that, "* * * it is probable that these birds do not assume adult plumage till the second year."

This species varies tremendously in size, large and small birds of similar age being found together. Females average larger than male, but even within each sex, the wing length varies about 20 millimeters. Gyldenstolpe [42] gives 171 millimeters as the longest wing seen by him. A specimen (female) from Rhino Camp, in the United States National Museum (No. 216127) exceeds this by 2 millimeters and is the largest one known to me.

In the region covered by this report, the African jacana is wide spread throughout Ethiopia, Kenya Colony, and to a lesser extent, Somaliland. I know of no records from northern Somaliland, and in Ethiopia the species is commoner in the western parts of the country than it is east of the Rift Valley.

In tropical east Africa the breeding season varies, being strictly correlated with the rains in regions away from large permanent bodies of water, and less definitely limited around large lakes such as Victoria, or even Naivasha, etc. However, it is at its height at the beginning of the long rains. In Uganda and Kenya Colony nests and eggs have been taken in June; [43] while farther north the long rainy season does not start until about six or seven weeks later. Erlanger[44] writes that in Ethiopia the birds breed in August, which coincides quite closely with the inception of the rains.

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[40] Birds of S. Afr., vol. 4, 1906, p. 339.

[41] Ibis, 1900, p. 451.

[42] Kungl. Sv. Akad. Handlgr., 1924, p. 299.

[43] See Van Someren, Ibis, 1916, pp. 202–203.

On March 18, at Black Lake Abaya, Mearns recorded 100 of these lily trotters.

Family CHARADRIIDAE

CHARADRIUS HIATICULA TUNDRAE (Lowe)

Aegialitis hiaticula tundrae Lowe, Bull. Brit. Orn. Cl., vol. 36, p. 7, 1915: Yenesei Valley, Siberia.

Specimens collected:

Male, Djibouti, French Somaliland, November 22, 1911.

The single specimen collected is not fully adult, as it has the pectoral band dark brown, not black.

Both races of this palearctic plover winter in Africa, but the Siberian one migrates to the eastern half of the continent, while the European birds winter on the western coasts south to Cape Town.

In studying this species I have assembled a series of 32 specimens of both forms. My conclusions agree with those of Hartert,[45] the typical race being larger, having longer wings, and averaging somewhat paler above. However, the color of the upper parts seems to be a less constant character than the wing length. Of African examples, I have seen but four besides the one listed above. Two birds from Dar-es-Salaam, Tanganyika Territory, and one from Nairobi, Kenya Colony, are *tundrae*, while one from the south end of Lake Edward, Belgian Congo, is referable to the typical race. Van Someren[46] has listed both forms as winter visitors in Kenya Colony. His measurements, however, all agree with those of *tundrae* rather than *hiaticula*, and it seems somewhat doubtful that both forms are represented in his series. On the other hand he writes that both dark and lighter specimens are present in his series and that, "* * * it is noticeable that November to January birds are paler than February to April specimens, and some of the latter are as pale as the typical form."

Granvik[47] lists *hiaticula* from Lake Naivasha, Kenya Colony—a specimen apparently not fully adult. No measurements are given. This is probably also referable to *tundrae*.

Mrs. Meinertzhagen, who has made a detailed study of this species, writes[48] of *tundrae* that while "* * * it has distinctly darker upper parts than *C. h. hiaticula* in summer, the latter is decidedly darker in winter than in summer plumage, so that it seems impossible to differentiate and state that the darker specimens are *tundrae.* The measurements of the two forms unfortunately overlap * * *." Birds collected in the winter range are better identified by size alone.

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[44] Journ. f. Ornith., 1905, p. 85.

[45] Vög. pal. Fauna, pp. 1533–34.

[46] Nov. Zool., vol. 29, 1922, p. 14.

[47] Journ. f. Ornith., 1923, Sonderheft, p. 35.

[48] Practical Handbook Brit. Birds, vol. 2, 1924, p. 519, footnote.

Col. R. Meinertzhagen[49] writes that *tundrae* is the race that occurs in Egypt, Somaliland, and Kenya Colony in winter. "In the latter country they are common on the coast from October onward. They do not seem to move till April, and a few were still at Lamu on the coast on April 22, after which date all had gone north."

Erlanger[50] collected a mated pair at Garre Liwin, southern Somaliland, on May 16, and assumed that they were breeding there; this constituting the first record of this species nesting in Africa. Zedlitz[51] also records the ringed plover as an occasional resident in northeastern Africa. However, many years before, Von Heuglin had noted late birds, sometimes in pairs, along the Red Sea coasts in May and June, but never actually found them breeding. Until definite proof of their breeding there is produced, these records can not be interpreted as evidence of nesting. It is a well known fact in other parts of the world that the first south-bound (postbreeding) migrants of a species often arrive before the last of the north-bound individuals have left for the breeding grounds. Probably some such explanation is pertinent in the present instance.

Mearns found this plover very abundant at Djibouti.

CHARADRIUS DUBIUS CURONICUS Gmelin

Charadrius curonicus Gmelin, Syst. Nat., vol. 1, pt. 2, p. 692, 1789: Curonia, *i. e.* Courland.

Specimens collected:

Female, Sadi Malka, Ethiopia, December 20, 1911.
Two males, Hawash River, Ethiopia, February 10, 1912.

This bird is widely distributed over Africa south to the equator in winter. There are not many Ethiopian records, however, but that is probably partly due to the paucity of observers rather than of birds. Ogilvie-Grant[52] listed a specimen from Lake Harrar Meyer, December 30, 1898. This was the first record for the country and remained unique until Erlanger[53] obtained a second example on Gididsha Island, Abaya Lake, January 28, 1901. The three collected by Mearns appear to be the only other specimens from

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[49] Ibis, 1922, p. 72.
[50] Journ. f. Ornith., 1905, p. 63.
[51] Idem, 1909, p. 308.
[52] Ibis, 1900, p. 330.
[53] Journ. f. Ornith., 1905, p. 63.

Ethiopia. According to Zedlitz[54] this bird occurs in northwestern Eritrea (one specimen from Keren) and in the Tigre and Amhara provinces of Ethiopia. No specimens are listed and no observations recorded, however, for the Abyssinian provinces. This distribution is based on his map[55] as in the text he merely writes that it occurs in regions I and II on the map.

In Kenya Colony[56] this bird is not as common as *C. hiaticula tundrae* and is almost absent from the coastal areas. Zedlitz[54] also suggests that the bird is absent along the coasts of Eritrea and the Danakil area. In Egypt it is very common. The abundance of the bird in Egypt and its scarcity along the Red Sea and Indian Ocean coasts of Africa suggest that the valley of the Nile is the migratory highway followed by this plover. Yet it has been taken at Aden, Arabia, and on the island of Socotra, but these records are probably of birds journeying south from Asia rather than Europe.

Mearns found this species in great numbers at Djibouti, so it appears that migrants cross over at the south end of the Red Sea, even if few actually migrate along that body of water.

CHARADRIUS ALEXANDRINUS SEEBOHMI Hartert and Jackson

Charadrius alexandrinus seebohmi Hartert and Jackson, Ibis, 1915, p. 529: Aripo, N. Ceylon.

Specimens collected:

Two males and one female, Djibouti, French Somaliland, November 22, 1911.

These three birds agree more nearly with the description of *seebohmi* than with any other race, although they have larger bills than *seebohmi*. I have compared them with a series of *alexandrinus* and of *dealbatus*. The present race has a very remarkable distribution, quite comparable to, but not as extensive as, that of *Dromas ardeola*. It is entirely confined to the coasts of the Indian Ocean from Ceylon to the mouth of the Red Sea (Somaliland coast). In Africa its range is restricted, as far as known, to the coast from Massawa, Eritrea, to Djibouti, French Somaliland. The birds of southern Somaliland are probably *alexandrinus*,[57] as are also the birds of Egypt, Syria, and Palestine.[58] It is not known if *seebohmi* is resident in the Somali coast or not. All the specimens taken are winter birds.

The birds measure as follows: Wing (male) 105–107.5, (female) 106; tail (male) 46–47, (female) 43.5; culmen (male) 15–17,

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[54] Journ. f. Ornith., 1910, p. 309.

[55] Idem, pl. 8.

[56] Meinertzhagen, Ibis, 1922, p. 72.

[57] See Zedlitz, Journ. f. Ornith., 1914, p. 627.

[58] See Meinertzhagen, Ibis, 1922, p. 72.

(female) 15 millimeters. In true *seebohmi* the bill is said to measure only 12–13.5 millimeters. However, the measurements (for the bill) given by Hartert and Jackson[59] for *alexandrinus* and *dealbatus* are also smaller than mine for these races, so it seems that the difference in our figures is due to methods of measuring the bill. My measurements are taken from the very base of the culmen to the tip; one of the arms of the dividers is pushed back to the junction of bill and skull, the other is extended till it touches the tip of the bill. My wing measurements are similar to those of Hartert and Jackson.

Just as this manuscript was about to go to press the description of *Charadrius alexandrinus pons* Neumann[60] reached me. I have not enough material to decide upon the validity of this form, said to inhabit the coast of southern Somaliland from Obbia to Kismayu, but the present specimens appear to be *seebohmi* and not *pons*. The latter is said to be noticeably paler above than any of the previously named races, and, to judge from Neumann's figures, is smaller than *seebohmi*. (He gives the wing length of *pons* as 100–104 in the males, 98–102 millimeters in the females.)

CHARADRIUS VARIUS VARIUS Vieillot

Charadrius varius VIEILLOT, N. Dict. d'Hist. Nat., vol. 27, 1818, p. 143: Africa.

Specimens collected:

One male, two females, and one nestling (male), Hor, Kenya Colony, June 26–27, 1912.

Male, Lake Rudolf, Kenya Colony, July 6, 1912.

Two females, Lake Rudolf (south end), Kenya Colony, July 7–8, 1912.

Soft parts: Newly hatched young—iris, dark brown; bill, black; feet, gray, yellowish on upper half of anterior aspect of tarsus; claws, black.

In an adult female: Iris, brown; bill, entirely black; legs and feet, dark gray; claws, black.

Charadrius pecuarius Temminck is a synonym.

This form occurs throughout Africa from the southern tip to Senegal in the west and to Egypt in the east. It is also common in Madagascar. Another race, *sanctae-helenae*, characterized by its larger size, inhabits the island of St. Helena. Nicoll[61] described another form *allenbyi* from the delta region of Egypt. This form, said to be larger than *varius* but not as large as *sanctae-helenae*, is not known to occur within the limits of Ethiopian region as limited by Sclater.[62] The difference between it and *varius* is an average rather than absolute one. The typical form has a wing length of 97–106 (male), 97.5–111 millimeters (female), while Meinertzhagen [63] gives the corresponding measurements for *allenbyi* as 102–111 (male), 104–112 millimeters (female). Mearns' birds are all of the typical form as may be seen from their wing measurements: Male, 97, 99; female, 97.5, 105.5, and 111 millimeters, respectively. The largest female is intermediate and might be identified as *allenbyi* just as well as not. However, in view of the great distance between Hor, Kenya Colony, and the Nile delta of Egypt, it seems better to consider it merely an unusually large example of *varius*. The two races are alike in every respect except size.

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[59] Ibis. 1915, pp. 528–529.

[60] Nov. Zool., vol. 35, 1929, p. 212: Kismayu.

[61] Bull. Brit. Orn. Cl., vol. 42, 1921, p. 7.

The newly hatched chick is covered with down which is whitish, slightly tinged (perhaps stained) with pale buff on the lateral parts of the under side; the forehead and lores are very pale buffy white; the rest of the upper parts are mottled blackish and pale buffy, the feathers being black, broadly tipped with buffy, the latter color most pronounced on the lower back and rump, palest on the crown, nape, and interscapulars. The bird was with the adult male when collected, a fact which suggests that in this species, as in so many others of its group, the care of the eggs and young is assumed, at least in part, by the male.

Birds in fresh plumage have the breast much more suffused with tawny than do individuals in worn feathering; the color, being confined to the apical parts of the feathers, disappears with abrasion, leaving the breast much whiter in appearance.

The juvenal plumage resembles that of the adult but lacks the black band on the crown and the broad line from the bill through the eye to the posterior margin of the auriculars, and has the cheeks grayish brown like the crown.

There is a curious variation in the coloring of the primaries. Most birds have the outer six primaries fuscous black on their outer webs and have a white patch on the outer web of the seventh. Occasionally, however, birds have the whitish patch on the sixth remex.

The molt of the primaries begins with the innermost and proceeds towards the outside, simultaneously in both wings.

A series of 11 birds from Madagascar show no constant differences from a group of 16 African examples.

Doctor Mearns wrote in his notes that, " * * * at Hor, in central-northern British East Africa these birds were breeding in June, 1912, but I could not find the eggs; although I caught a chick recently from the egg."

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[62] Syst. Avium Ethiop., 1924.

[63] Ibis, 1922, p. 73.

In his description of the Madagascan *Aegialites thoracica*[64] Richmond used the name *varius* in place of the currently used *pecuarius*, but his notes appear to have been overlooked by subsequent investigators. Sharpe[65] gives "*Charadrius varius* (*nec* Linn.), Vieill * * * " as a synonym of the bird he lists as *Aegialitis pecuaria.* However, there is no *Charadrius varius* Linnaeus, but only a *Tringa varia*[66] which is a synonym of the black-bellied plover, (*Squatarola*), and consequently Vieillot's name is in no way preoccupied or antedated by that of Linnaeus, and having five years priority over Temminck's *pecuarius*, *varius* must be used for the present bird.

AFROXYECHUS TRICOLLARIS TRICOLLARIS (Vieillot)

Charadrius tricollaris VIEILLOT, N. Dict. d'Hist. Nat., vol. 27, p. 147, 1818: Africa; restricted type locality, Cape Town. (See C. Grant, Ibis, 1915, p. 57.)

Specimens collected:
Male, Duletcha, Ethiopia, January 24, 1912.
Male, Gato River near Gardula, Ethiopia, April 16, 1912.
Male and female, Hor, Kenya Colony, June 26, 1912.
Male, Dussia, Kenya Colony, July 3, 1912.
Male, Lake Rudolf, Kenya Colony, July 6, 1912.

Soft parts; Iris, hazel brown; naked eye rim, red; bill with basal half, vinaceous, distal half, black; feet, pale fleshy brown; claws, black (both sexes).

Mathews[67] created the genus *Afroxyechus* for the present species and included in it *forbesi* and *bifrontatus* as well. These three species differ from the other members of the genus *Charadrius* in having a long wedge-shaped tail, and longer tarsi and feet. Sclater[68] considers *Afroxyechus* only a subgenus of *Charadrius*, but if it is to be kept as a subgenus the species should be referred to *Oxyechus* rather than to *Charadrius* as they agree more with the former than with the latter. The most satisfactory arrangement seems to be to maintain *Afroxyechus* as an independent generic entity.

The material assembled for the present study comprises 29 specimens of *tricollaris*, 1 of *forbesi*, and 4 of *bifrontatus.* Sclater[68] considers these three as conspecific, but I feel that *forbesi* is probably entitled to specific rank as it differs from the others in several respects—size, head color, and rectrix pattern. Dr. James P. Chapin informs me that he is of the same opinion. The Madagascan form *bifrontatus* is very well marked, but is merely a race of *tricollaris*.

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[64] Proc. Biol. Soc. Wash., vol. 10, 1896, pp. 53–54.

[65] Cat. Birds Brit. Mus., vol. 24, 1896, p. 297.

[66] Syst. Nat., 1766, vol. 1, p. 252.

[67] Birds of Australia, vol. 3, p. 124.

[68] Syst. Avium Ethiop., 1924, p. 120.

KEY TO THE AFRICAN SPECIES AND RACES OF THE AFROXYECHUS GROUP

A^1. No white on forehead or forward part of crown ______________ **forbesi.**
A^2. White present on forehead or forward part of crown.
  B^1. Forehead entirely white (to top of bill) ___________________ **tricollaris.**
  B^2. Forehead not entirely white but dark gray above bill, then a white band on top ______________________________________ **bifrontatus.**

The first species, *forbesi* is west African in range, being known to occur from Senegal and Cameroon to Bumba, central Belgian Congo; *bifrontatus* is confined to Madagascar; while *tricollaris* is found throughout eastern Africa from the Sahara and the Red Sea to the Cape Province, westward across Rhodesia to Angola, and north, on the west coast, to the mouth of the Congo.

Two males from British Somaliland are slightly paler and smaller than a series from Ethiopia, Kenya Colony, and Tanganyika Territory. They are slightly lighter gray on the cheeks and have the white forehead patch somewhat more extensive. However, two unsexed, worn skins labeled "South Africa" (E. L. Layard collection) are even smaller. The following wing measurements give some idea of the variations in this species. The largest wing is 114 millimeters, a female from Kenya Colony; the smallest 105 millimeters, an unsexed South African bird. Two males from British Somaliland have wing lengths of 105.5, and 107 millimeters; three males from Ethiopia, 110, 110, and 111, respectively; 6 males from Kenya Colony 107, 108.5, 109.5, 110, 110.5, and 112, and four females from the same country, 106, 109.5, 110, and 114 millimeters, respectively; a male from Tanganyika Territory, 108, and a female, 110 millimeters; a female from South Africa 107, while 2 unsexed South African birds measure 105 millimeters each.

Aside from the actual specimens obtained, this species was met with at the Abaya Lakes, March 19, 2 birds seen; Gato River, March 29 to May 17, 4 noted; and Lake Rudolf, 5–8, when 50 were seen.

SQUATAROLA SQUATAROLA (Linnaeus)

Tringa squatarola LINNAEUS, Syst. Nat., ed. 10, vol. 1, p. 149, 1758; Europe; restricted type locality, Sweden.

Specimens collected:

Male, Djibouti, French Somaliland, November 22, 1911.

The present species has been divided into three races, all of which are practically indistinguishable. This plover is such a notable wanderer and migrant that it is absolutely essential to restrict subspecific study to series of *breeding* specimens from different localities.

The Siberian birds have been separated on the basis of larger size, wing 196–213, bill 29–34.5 as against wing 189–201, bill 28–30.5 millimeters in typical material. This northeastern form, *hypomelaena*, is said by Meinertzhagen[69] to occur in winter in northern Somaliland, while the birds of the Kenya coast are *squatarola*. The single specimen collected by Mearns has a wing length of 189 millimeters, the minimium for *squatarola* as given by Hartert[70] and a bill 33 millimeters long, nearly the maximum for *hypomelaena*. It is obvious that the two forms can not be maintained. The North American *cynosurae* is likewise unrecognizable. A series of 77 birds gives the following results (from data tabulated by J. L. Peters, based on the material in the Museum of Comparative Zoölogy).

Specimens	Number	Sex	Wing (millimeters)	Locality
S. s. squatarola	3	♂	179–195 (184)	
	2	------	196–198 (197)	
S. s. cynosurae	3	♂	182–195 (188. 7)	Arctic America.
	2	♀	183–192 (187. 5)	
	2	------	195–197	
	10	♂	181–205 (189. 6)	Eastern United States, spring.
	10	♀	180–195 (187. 9)	
	10	♂	180–193 (186. 4)	Eastern United States, fall.
	10	♀	174–188 (182. 3)	
	10	♂	182–198 (189. 0)	Western United States, fall.
	10	♀	181–199 (187. 7)	
S. s. hypomelaena	2	♂	194–200 (197)	Siberia.
	1	♀	196	
	3	♀	194–200 (198)	East Indies; migrants.

An adult male from Dar-es-Salaam, Tanganyika Territory, is much smaller than any other specimen, having a wing length of only 179 millimeters.

Sclater[71] records only the typical form (he uses trinomials) from Africa. However, if the races are to be recognized it seems that *hypomelaena* should be added to his list.

STEPHANIBYX CORONATUS CORONATUS (Boddaert)

Charadrius coronatus BODDAERT, Tabl. Pl. Enlum., p. 49, 1783: Cape of Good Hope (ex Daubenton).

Specimens collected:

Female, 18 miles southwest of Hor, Kenya Colony, July 2, 1912.
Female, Malele, Kenya Colony, July 27, 1912.
Female, 18 miles south of Malele, Kenya Colony, July 28, 1912.

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[69] Ibis, 1922, p. 73.

[70] Vög. pal. Fauna, p. 1554.

[71] Syst. Avium Ethiop., 1924, p. 122.

Soft parts; Iris, hazel brown; distal half of bill and the claws, black; proximal half of bill, the tibiae, and the feet, red.

In studying the variations of the crowned plover I have assembled a series of 70 specimens from Ethiopia, British Somaliland, Kenya Colony, Uganda, Tanganyika Territory, and South Africa. As already reported on [72] the examination of this material shows there are three distinct forms of this species—a large, northeastern highland race (*suspicax*), and two smaller ones, one of which, occurring in Somaliland (*demissus*), has the upper parts sandy rufous in fresh plumage, the other (typical *coronatus*), inhabiting the lower parts of East Africa and South Africa, has darker, more grayish-brown, upper parts. It is quite likely that the birds of South West Africa will prove to be a fourth race, as they are said to be paler, and more sandy hued, than typical *coronatus.*

Inasmuch as the original paper in which I described *suspicax* and *demissus* may not be available to as large a coterie of investigators as the present report, I shall here repeat some of the statements first made there.

Erlanger [73] noticed that Somaliland birds were more sandy-yellowish in color above than East African examples, but felt that the difference was unimportant. Zedlitz [74] found that the Somaliland specimens were very pale, like those of southwest Africa, but more rufescent, less grayish. He also noted that the largest birds in this series came from Ethiopia, but that the size difference between them and more southern birds was not constant. Gyldenstolpe [75] studied the size variations of this plover and decided that dimensions were not reliable as taxonomic characters. However, he did not differentiate between the sexes when tabulating his data. Likewise, no indication was given of the altitudes from which the birds came. I find that these two factors, sex and altitude, are important and provide a key to the rather complex variations of this species. The birds of Ethiopia are large and form a perfectly recognizable race based on size, but the difference between them and more southern birds is best marked in the males and not at all well shown in the females. Also, the large northern birds occur farther south (toward the Equator, not farther south from the Equator) in very high localities, such as Mau, Kenya Colony (9,000 feet or 2,700 meters). In other words, the large form is not wholly Abyssinian (although chiefly represented in collections by specimens from Ethiopia), but an eastern highland race with its center of abundance in the northern part of its range. This form, *S. c. suspicax*, is similar in color to typical *coronatus*, but the males are larger; wings 205–215 as against 184.5–207 millimeters; culmen 32–36 as against 28–33 millimeters.

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[72] Proc. N. Eng. Zool. Cl., vol. 10, Nov., 1928, pp. 91–97.

[73] Journ. f. Ornith., 1905, pp. 65–66.

[74] Idem, 1914, pp. 628–629.

[75] Kungl. Sv. Vet. Akad. Handlgr., 1924, pp. 200–201.

The color of the upper parts is not a constant character in southern and eastern birds, but in fresh specimens from the lowlands of Somaliland the feathers of the back are edged with light sandy rufous, and give the upperparts the light sandy tone mentioned by both Erlanger and Zedlitz. It should be noted, however, that as these tips wear off, the birds become quite similar to those of tropical East Africa. It follows, then, that only specimens in fresh plumage are of value in a subspecific study of this bird. Experience will probably show that it will not always be possible to identify other than freshly plumaged birds of the pale Somali race, *demissus*, except by locality. However, worn examples are slightly more avellaneous above than similarly abraded specimens of *coronatus*. It is essential that similar plumages of the two be compared. The subspecies *S. c. demissus* is known as yet only from British Somaliland, but probably occurs throughout Italian Somaliland as well, and possibly the adjacent parts of Ethiopia, east of Gallaland. A specimen from Barsaloi, Kenya Colony (south of the southern end of Lake Rudolf), is intermediate between *coronatus* and *demissus*, a fact which suggests that the latter race, like so many Somaliland forms, may range across Jubaland into northern Kenya Colony. On the other hand, the present three birds from near Hor and Malele, are best referred to the nominate form.

For the convenience of students with less adequate material available for study, I append a table of measurements of the adult birds examined.

1. S. coronatus coronatus

Locality	Sex	Wing	Tail	Culmen
South Africa, Natal	♂	207. 5	98. 0	31. 0
Tanganyika Territory:				
Dodoma	♂	199. 0	93. 0	31. 0
Do	♂	197. 0	94. 0	30. 5
Saranda	♂	198. 0	90. 0	28. 0
Singida	♂	194. 5	88. 0	30. 0
Kenya Colony:				
Guaso Nyiro	♂	193. 5	95. 5	31. 0
South Guaso Nyiro	♂	190. 5	93. 5	28. 5
Do	♂	184. 5	91. 0	31. 0
Do	♂	201. 0	97. 0	30. 5
Do	♂	200. 0	97. 0	32. 5
Do	♂	192. 0	89. 0	30. 5
Do	♂	197. 0	93. 0	30. 0
Mount Kenia, 6,000 feet (1,800 meters)	♂	198. 5	90. 5	31. 0
50 miles south Lake Naivasha	♂	196. 0	92. 0	29. 5

1. *S. coronatus coronatus*—Continued

Locality	Sex	Wing	Tail	Culmen
Kenya Colony—Continued.				
Kapiti Plains	♂	197. 0	90. 0	31. 5
Kapiti Plains	♂	191. 0	90. 0	31. 0
Kidong Valley	♂	187. 5	91. 0	31. 5
Do	♂	195. 0	97. 0	30. 5
Do	♂	200. 5	100. 5	33. 0
Guaso Narok	♂	202. 0	95. 0	29. 0
Naivasha	♂	199. 0	93. 0	29. 5
Do	♂	204. 0	96. 0	32. 0
Northern Guaso Nyiro	♂	197. 5	89. 0	33. 5
Uganda, Ekagango, Ankole	♂	187. 0	82. 0	30. 0
Do	♂	192. 5	88. 5	29. 0
Do	♂	194. 0	88. 5	30. 0
South Africa, Natal	♀	200. 0	91. 5	30. 5
Tanganyika Territory, Saranda	♀	190. 5	83. 0	26. 5
Kenya Colony:				
Kidong Valley	♀	196. 0	103. 5	31. 5
Barsaloi	♀	184. 5	84. 5	30. 0
Wajheir	♀	199. 0	95. 0	32. 5
Northern Guaso Nyiro	♀	188. 0	81. 0	31. 0
18 miles southwest of Hor	♀	191. 0	88. 5	30. 0
Malele	♀	200. 0	91. 0	34. 5
18 miles south of Malele	♀	195. 5	90. 5	33. 0
Southern Guaso Nyiro	♀	205. 0	94. 5	28. 0
Southern Guaso Nyiro, Sotik	♀	187. 0	91. 5	29. 5
Do	♀	183. 0	82. 0	30. 5
Do	♀	193. 0	89. 5	33. 0
Do	♀	189. 0	91. 0	31. 0
Laikipia	♀	184. 0	88. 0	-------
Meru River	♀	195. 0	87. 0	34. 0
Sianna	♀	182. 0	85. 5	27. 3
South Africa	------	194. 0	90. 0	31. 5

2. *S. coronatus suspicax*

Locality	Sex	Wing	Tail	Culmen
Ethiopia:				
Tollo	♂	206. 0	98. 5	34. 5
Do	♂	215. 0	103. 0	34. 0
Sadi Malka	♂	215. 0	101. 0	36. 0
Do	♂	208. 5	95. 0	33. 5
Hawash River	♂	208. 5	95. 0	34. 0
Bodessa	♂	205. 5	93. 0	32. 0
Sheik Hussein, Bali	♂	209. 0	100. 0	33. 0
Do	♂	201. 0 (Worn.)	101.0	33. 0
Lake Shala	♂	205. 0	100. 0	34. 0
Kenya Colony, Mau	♂	207. 0	99. 0	30. 0
Ethiopia:				
Tertale	♀	199. 0	93. 0	33. 0
Modjo	♀	202. 0	92. 0	33. 0
Do	♀	208. 0	94. 0	30. 0
Lake Shala	♀	200. 0	95. 0	29. 5
Kenya Colony, Mau	♀	208. 5	100. 0	34. 0
Ethiopia, Sadi Malka	------	212. 5	103. 0	34. 5
Kenya Colony, Mau	------	191. 0	93. 0	32. 0

3. S. coronatus demissus

Locality	Sex	Wing	Tail	Culmen
British Somaliland:				
Hullier	♂	191. 0	94. 0	30. 5
Do	♂	193. 0	84. 0	32. 5
Suk Soda	♂	193. 0	88. 3	30. 5
Do	♂	196. 0	90. 5	32. 5
Do	♀	196. 0	91. 0	32. 0
Hullier	♀	195. 0	89. 0	33. 0

It will be seen that the East African birds of the typical race are smaller than Natal specimens. The type locality of *coronatus* is the Cape of Good Hope and it might therefore be concluded that the smaller eastern birds are separable, in which case the question would arise as to whether the large southern *coronatus* and the large northern *suspicax* were distinct. But the South African birds are not all as large as the few I have examined (to judge from the literature) and the differences between them and East African ones become less as the series increase.

Besides the specimens collected, the species was observed as follows: Chaffa villages, June 23–25, 175 birds; Hor, June 26–30, 25 seen; dry river south of Hor, July 1–2, 25 noted; Dussia, July 3–4, 25 birds; Lake Rudolf and country immediately to the southeast, July 5–12, 90 seen; Indunumara Mountains, July 12–18, 30; Endoto Mountains, July 19–24, 16 birds; Er-re-re, July 25, 10 seen; Le-se-dun, July 26, 10 birds; Malele and district to the south for 45 miles, July 27–30, 45 seen; Northern Guaso Nyiro River, July 31 to August 3, 20 birds; Lekiundu River, August 4–8, 75 seen; Meru, August 9, 25 birds; and Athi River, August 30 to September 2, 100 birds observed.

STEPHANIBYX CORONATUS SUSPICAX Friedmann

Stephanibyx coronatus suspicax Friedmann, Proc. N. Eng. Zool. Cl., vol. 10, November 13, 1928, p. 95; Sadi Malka, Ethiopia.

Specimens collected:

Two males, Tollo, Ethiopia, December 16, 1911.
Two males, 1 unsexed, Sadi Malka, Ethiopia, February 3, 1912.
One male, Hawash River, Ethiopia, February 7, 1912.
One male, Bodessa, Ethiopia, May 23, 1912.
One female, Tertale, Ethiopia, June 8, 1912.

Soft parts: Iris hazel brown; distal half of bill black, proximal half red; tibiae and feet red, claws black.

The characters and range of this race have already been discussed under the typical subspecies and need not concern us here.

This plover is a denizen of the steppe country and the more open parts of the Acacia parklands. It is widely distributed throughout its range and, while common, is seen chiefly in pairs or family groups, seldom in large flocks.

Little is known of the breeding habits of this race. Erlanger[76] found an egg on March 20 at Huluko in Arussi-Gallaland.

Mearns observed this race of the crowned plover at the following localities: Abaya Lakes, March 18–20, 18 birds; Anole, May 18, 5 seen; Kormali, May 19, 5 birds; Tertale, June 7–12, 12 noted; El Ade, June 12–14, 8 seen; Mar Mora, June 14, 4; Turturo, June 15, 4 seen; Yebo, June 20, 12 birds; Karsa Barecha, June 21, 50 birds; Malata, June 22, 50 birds noted.

STEPHANIBYX LUGUBRIS (Lesson)

Charadrius lugubris Lesson, Dict. Sci. Nat. (ed. Levrault), vol. 43, p. 36, 1826: no locality: Senegal *apud* Grant, Ibis, 1915, p. 56.

Specimens collected:

Female, between Thika and Athi Rivers, Kenya Colony, August 29, 1912.

Soft parts: Iris yellow; bill, legs, feet, and claws purplish black.

Sclater[77] gives the range of this bird in eastern Africa as extending north to Zanzibar. It occurs considerably further to the north however. Van Someren[78] records it from Lamu on the Kenya coast and from Nambeziwa, Uganda; while Gyldenstolpe[79] lists specimens (collected by Arrhenius) from the southern shores of Lake Edward. In the Museum of Comparative Zoölogy there is a specimen from Hima, Toro, western Uganda. The bird from the Thika River listed above is the first published record for the inland districts of Kenya Colony, but is not a surprising one, as it is geographically intermediate between the coastal record (Lamu) and those from Uganda. I know of one other similar record, a male from Telek River, Sotik district, Kenya Colony, now in the United States National Museum.

Van Someren[78] writes that his coastal specimens have narrower black bands separating the gray breast from the white abdomen than do his Uganda examples. I have seen no birds from the coast itself, but one of two individuals from Morogoro, Tanganyika Territory, has the band as wide and well developed as in Mearns' specimen and in another from western Uganda (Toro).

If further material bears out Van Someren's observation, the narrow-banded form will probably be found to have a very limited range in an east-west direction, and may be confined to the northern part of its coastal distribution.

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[76] Journ. f. Ornith., 1905, pp. 65–66.

[77] Syst. Avium Ethiop., 1924, p. 123.

[78] Nov. Zool., vol. 29, 1922, p. 15.

[79] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 301.

One of the Morogoro birds (male) has the pectoral band very narrow, but this is partly due to the fact that the plumage is fresh and the white tips of the feathers of the lower breast have not been worn off.

This species in quite similar to *S. melanopterus* but is smaller, has the primary under wing coverts and the greater upper wing coverts gray (white in *melanopterus*).

The small series available for study indicates considerable variation in size for the species, but, proportionately, not as much as in *coronatus*.

Locality	Sex	Wing	Tail	Culmen
Tanganyika Territory, Morogoro	♂	178	70. 5	23. 0
Do	♀ (?)	173	69. 5	22. 0
Kenya Colony, Thika and Athi Rivers	♀	172	65. 5	23. 5
Uganda, Hima, Toro	♀	178	69. 0	22. 0

To these measurements may be added the following of a male from Telek River, Sotik district, Kenya Colony. This bird I have not seen, but the measurements were made years ago for the late Doctor Mearns: Wing 170, tail 63, culmen 23 millimeters.

The crown and occiput are darker in the single male examined than in any of the females, but whether there is a constant sexual difference I can not say. It seems doubtful, however, as the other species of the genus present no such dimorphism.

The Uganda specimen has the gonial portion of the mandible bent to the left. It has the lower throat and breast somewhat duskier than the other specimens. The Tanganyika birds have the white forehead patch narrower posteriorly than do the ones from Kenya Colony and Uganda.

Besides the specimen preserved, this plover was seen as follows: West of Ithanga Hills, August 28, 4 birds; Athi River, August 29 to September 2, 84 seen.

STEPHANIBYX MELANOPTERUS MELANOPTERUS (Cretzschmar)

Charadrius melanopterus CRETZSCHMAR, in Rüpp. Atlas, p. 46, pl. 31, 1829: Djedda, Arabia.

Specimens collected:

Three males, 2 females, Arussi Plateau, Ethiopia, February 14–24, 1912.

Soft parts: Iris yellow, eye ring vinaceous red; bill black; legs and feet black tinged with red (in two birds) or base of tibiae dusky vinaceous, feet brownish black tinged with vinaceous (one bird); claws black.

Zedlitz[80] has separated the birds of South and east Africa from those of Arabia and Ethiopia on the basis of size, the northeastern birds being larger. Grant[81] does not recognize *minor* of Zedlitz and calls birds from Kenya Colony typical material. Yet his measurements corroborate those given by Zedlitz; South and east African birds having wings 201–215 millimeters in length, Abyssinian examples having wings 214–225 millimeters long. Van Someren[82] gives somewhat different wing measurements, viz, east African birds, wings 215–218, northeast African 218–230 millimeters. The present series collected by Mearns have wings 217 (female) to 241 (male) millimeters long, and clearly indicate the validity of Zedlitz's work. The following table illustrates the distinctness of the two forms.

S. melanopterus melanopterus

Locality	Sex	Wing	Tail	Culmen
Ethiopia, Arussi district	♂	220	84. 0	27. 0
Do	♂	241	88. 0	30. 0
Do	♂	236	87. 5	28. 5
Do	♀	219	80. 0	26. 0
Do	♀	217	79. 0	28. 5

S. melanopterus minor

Locality	Sex	Wing	Tail	Culmen
Kenya Colony, 37° E., 0° 10′ S	♂	211	77. 5	28. 5
Kenya Colony, Athi River	♀	199	77. 0	27. 0
South Africa, Natal	♀	209	75. 5	27. 5

There is considerable individual variation in some of the color characters. Some birds have much more of a purplish sheen to the feathers of the back; others have these parts more bronzy; the amount of white on the forehead and anterior part of the crown is extremely variable, but this may be correlated with age, younger birds having less white (and that not pure, but mottled with gray) and older individuals more of it. In extreme cases, even the lores are whitish, connecting the white of the chin and upper throat with that of the forehead.

The outer, middle, upper wing coverts, when fresh, are broadly tipped with white and subterminally narrowly banded with black, but the white tips wear off to, and sometimes include, the black lines.

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[80] Orn. Monatsb., 1908, p. 180.

[81] Ibis, 1915, pp. 56–57.

[82] Nov. Zool., vol. 29, 1922, p. 15.

This plover is a bird of the highlands, and is unknown in the lower parts of Ethiopia. Blanford[83] writes that it occurs above 10,000 feet (3,000 meters) but that he never met with it below 7,000 feet (2,100 meters).

STEPHANIBYX MELANOPTERUS MINOR Zedlitz

Stephanibyx melanopterus minor ZEDLITZ, Orn. Monatsbr., vol. 16, p. 180, 1908: S. Africa.

Specimens collected:

Female, Juja Farm, Athi River, Kenya Colony, August 31, 1912.

Soft parts: Iris, brown; bill, black; legs and feet, vinaceous; claws, black.

As indicated under the typical form, this race is characterized by its smaller size. The single specimen collected is unusually small, however, having a wing length of only 199 millimeters. Van Someren[84] gives 215 millimeters as the minimum for his series, but a male from Kenya Colony (see table under preceding race) has a wing 211 millimeters long.

The width of the black pectoral band varies from about 12 to 25 millimeters (depending partly on the make of the skin, but mostly on the birds themselves). East African examples are not separable from South African birds. This bird is one of the few plovers that is more an inhabitant of dry plains than of the neighborhood of water. It occurs at lower altitudes than the northern, typical form. It is worthy of note that size and altitude are apparently correlated in the species of *Stephanibyx*, the larger birds existing at higher elevations.

HOPLOPTERUS SPINOSUS (Linnaeus)

Charadrius spinosus LINNAEUS, Syst. Nat., ed. 10, vol. 1, p. 151, 1758: Egypt.

Specimens collected:

Male adult, Bilan, Ethiopia, December 19, 1911.

Male adult, Wadi Malka, Ethiopia, December 21, 1911.

Three male adults and 6 female adults, Sadi Malka, Ethiopia, December 20, 1911 to January 30, 1912.

One male adult, no locality, Ethiopia (probably), March 3, 1912.

One unsexed, Black Lake Abaya, Ethiopia, March 24, 1912.

One unsexed, east Lake Rudolf, Kenya Colony, May 23, 1912.

Male adult, immature male, immature female, Hor, Kenya Colony, June 26–28, 1912.

Male adult, Tana River at mouth of Thika River, Kenya Colony, August 25, 1912.

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[83] Geol. and Zool. Abyss., 1870, pp. 429–430.

[84] Nov. Zool., vol. 29, 1922, p. 15.

Soft parts: Iris dark red; bill, legs, feet, and claws all black.

A series of 43 specimens from Palestine, Egypt, Ethiopia, Sudan, Uganda, Kenya Colony, Belgian Congo, Tanganyika Territory, and "West Africa" indicates that while this species is variable in size, the variations are purely individual and have no geographical significance. The wing length varies from 187 to 210 millimeters in male birds, and from 188 to 204.5 millimeters in females. The minimum given by Hartert[85] is 195 millimeters. The alar spur varies greatly in size, but birds with large and with small ones are found in the same general region. As a rule the spurs are longer and stouter in males than in females, but even this does not always hold as the extremes for two sexes are the same. The spurs vary in shape, some being straight, but most being slightly recurved. One specimen, a male from Wadi Malka (U.S.N.M. 243085) has the spur on the left wing normal, recurved, while the corresponding right one is greatly decurved and lies along, and follows, the contour of the bend of the wing.

The tarsus is likewise very variable in length. Two females from Tanganyika Territory have tarsi 75 millimeters long, while of 38 other specimens from various parts of Africa none has one longer than 69 millimeters, but 2 from Palestine have tarsi measuring 73 and 77 millimeters, respectively.

The two immature birds have the top of the head duller, less bluish-black than the adults and have the feathers tipped with sandy brown. The brown of the back, scapulars, and wing coverts is narrowly barred with pale sandy; the bars being in reality the light terminal margins of the feathers. The immature female has the forehead whitish; the male has it less so, more brownish, blending into the darker crown. The underparts resemble the adults but the black is duller, more brownish, less bluish, and the chin is white. The young male has the upper throat white as well, and in both the dark feathers of the lower throat are short as compared with those of adults, and do not overlap the white suprapectoral band.

When assuming the immature plumage the tail molt begins with the outermost rectrices and proceeds toward the middle ones. Both young birds have replaced all but the central pair. The remiges in these two specimens are all new and nearly full grown, but still basally enclosed by their sheaths for a short distance.

Sclater[86] gives the range of this plover as "* * * south to about the latitude of Zanzibar and Lake Hannington in Kenya Colony." I know of no coastal records south of Zanzibar, but inland, it certainly ranges south of Lake Hannington. In Tanganyika Territory it is known from several localities at the south end of Lake Victoria (Mwanza district), while between the lake and the coast it has been taken at many places—Morogoro, Mambojo, Lake Jipe. Rugeji, etc.

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[85] Vög. pal. Fauna, p. 1565.

[86] Syst. Avium Ethiop., 1924, p. 124.

This species is the northern representative of *H. armatus*, but as the two overlap considerably in range, and are very distinct in coloration, they can not be considered as anything but well marked species.

Mearns found the spur-winged plover abundant near water along the route from Bilan to Sadi Malka and also along the Hawash River where its sharp *hick-hick-hick* notes were frequently heard. At the Abaya Lakes, March 18–26, 162 birds were noted.

AFRIBYX SENEGALLUS MAJOR (Neumann)

Lobivanellus senegallus major NEUMANN, Orn. Monatsb., vol. 22, 1914, p. 8: Ghadi Saati, Mareb River, n. Ethiopia.

Specimens collected:

Male and female, Lake Abaya, Ethiopia, March 19–21, 1912.

Male and female, Gato River near Gardula, Ethiopia, April 16, 1912.

Soft parts: Male; iris white to grayish white, bluish next to the pupil; bill yellow, the maxilla tipped with black above; the upper third of facial wattles vinaceous, lower two-thirds yellow; narrow eye ring yellow; legs and feet primrose yellow; claws black.

Female; iris white, slightly bluish; wattles yellow, externally red on the upper third; legs and feet greenish yellow to plain yellow; other parts as in male.

Sclater [87] does not recognize Neumann's race *major*, and includes it in the typical form. However, the characters certainly are constant and the race is perfectly distinct. Van Someren [88] writes that he finds *major* to be recognizable. In the original description Neumann gives the wing length as 238–258 millimeters. The four birds collected by Mearns have wings measuring 231–251 millimeters, thereby agreeing with those of *major*. It is true that this species is quite variable individually, but nevertheless the size of Ethiopian birds is constantly larger than corresponding specimens from farther south and west.

Furthermore, the Ethiopian birds are highland dwellers, while typical *senegallus* occurs in the lower plains and savannahs of the southern Sudan right across to Senegal (Chapin's Sudanese and Ubanghi savannah districts). In the eastern Sudan (Darfur and eastwards) the birds are somewhat intermediate between *major* and

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[87] Syst. Avium Ethiop., 1924, p. 125.

[88] Nov. Zool., vol. 29, 1922, p. 17.

senegallus, but are nearer to the latter.[89] The birds increase in size from west to east, but the increase is not noted west of Darfur, east of which come some birds with wings 235 millimeters long.

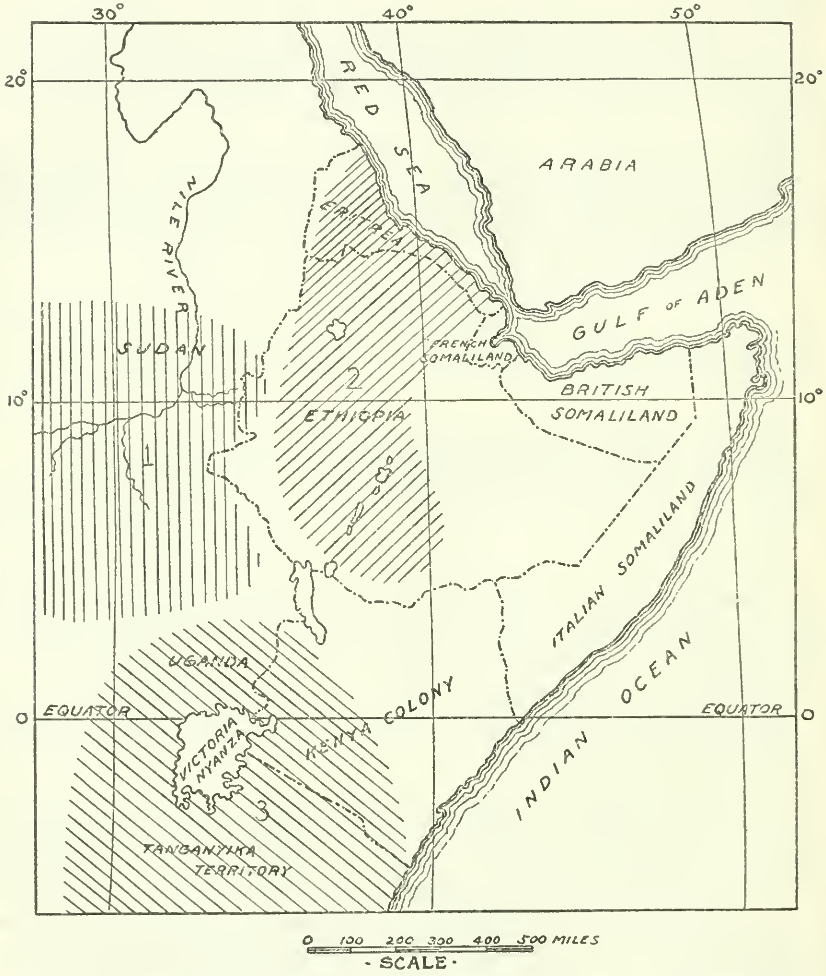

FIGURE 2.—THE DISTRIBUTION OF AFRIBYX SENEGALLUS IN NORTHEASTERN AFRICA: 1. AFRIBYX SENEGALLUS SENEGALLUS; 2. AFRIBYX SENEGALLUS MAJOR; 3. AFRIBYX SENEGALLUS LATERALIS

The southern form, *lateralis*, is easily distinguished by its dark flank patches which extend across the abdomen, making a dark band separating the grayish brown of the breast and upper abdomen from the white of the lower abdomen. Birds from the northeastern edge of the range (two specimens from western Uganda, and eastern

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[89] See Lynes, Ibis, 1925, p. 568.

Belgian Congo) have this abdominal band somewhat less developed than do specimens from Tanganyika Territory and Rhodesia, and are thus, in a sense, intermediate between *senegallus* and *lateralis.*

Gyldenstolpe[90] also notes this of a bird from Rutshuru Plains, eastern Belgian Congo.

Reichenow[91] records *senegallus* from Bussissi, Magango, and Karagwe, from all of which regions he also lists *lateralis.* These records undoubtedly all refer to the latter.

In coloration this species varies but little. The extent posteriorly of the white crown patch is the most variable character, but is entirely individual. The width of the terminal black areas on the outer secondaries also differs in different birds, being of course, vastly greater in *senegallus* than in *lateralis*, but yet not at all constant within each subspecies. Young birds have no white on the top of the head and but little black on the throat. The cheeks and sides of the head in adults vary from white to light grayish-white, always with black streaks; the breast likewise varies in darkness.

Three males of *major* have wings 235–251 millimeters long; while two females have them 231–234 millimeters. Four males of *senegallus* measure 228–232; and three females 222–232 millimeters.

The wattled plover was observed at the following localities: The Abaya Lakes, March 18–26, 82 birds; near Gardula, March 26–29, 4 seen; and Gato River, March 29 to May 17, 2 noted.

SARCIOPHORUS TECTUS TECTUS (Boddaert)

Charadrius tectus BODDAERT, Tabl. Pl. Enlum., p. 51, 1783: Senegal (from Daubenton).

Specimens collected:

Four males and four females, Dire Daoua, Ethiopia, December 17–21, 1911.

Male and female, Sadi Malka, Ethiopia, February 2–3, 1912.

One unsexed, Ourso, Ethiopia, October 19, 1911.

Soft parts: Iris yellow; wattles and base of bill red; tip of bill all around black; legs and feet vinaceous.

Sarciophorus tectus ranges from Senegambia to Nigeria, across the Sudan south of the Sahara to Ethiopia, Eritrea, south through Shoa and Somaliland to the Ukamba district of Kenya Colony. It has also been recorded from east of the Red Sea (Sinai Peninsula), and north of the Sahara to the Mediterranean, Syria, Cyprus, Crete, and the coastal parts of southeastern Europe. It contains two well marked races: the typical form, which occupies most of the range, and *latifrons* which is found in southern Somaliland and Kenya Colony east of the Rift Valley. The latter is characterized by the broad white band on the forehead, and generally darker color of the upperparts, and smaller size.

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[90] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 301.

[91] Vög. Afr., vol. 1, 1900, p. 194.

The species is quite variable, and inadequate series have led different workers to opposite conclusions, as the following notes indicate: Van Someren [92] writes that eight birds from northeastern Africa and Ethiopia are paler on the upperside than nine from Senegal. Zedlitz,[93] on the other hand, notes that birds from the high plateau of Mareb (northern Ethiopia) are darker than birds from Eritrea, but that the former are like examples from Senegal. Van Someren [92] gives the following wing measurements:

	Millimeters
Northeast Africa (8 specimens)	190–198
Senegal (9 specimens)	185–195
Uganda (4 specimens)	180–187

The series collected by Mearns in Ethiopia (11 specimens) have wings 185.5–198 millimeters long, indicating that no constant difference exists between western and eastern birds in this respect. It is true, however, that Ethiopian examples average slightly larger.

Not only have various writers contradicted each other with regard to variations, but also with reference to the altitudes at which *tectus* occurs. Blanford [94] says that it is a lowland form, chiefly confined to the coast, although he did meet with it in the Anseba valley. Erlanger [95] likewise states that it is a lowland form. Zedlitz [93] records it not only on the coast as in the Dahlak Islands and the Barca district of Eritrea, but also up to 2,000 meters (6,600 feet). In another paper [96] he writes that *tectus* is common in the highlands up to altitudes of more than 2,000 meters, but also occurs low down near the coast. The only conclusion to be made is that the species is not as restricted altitudinally as are many others.

Claude Grant [97] does not recognize *latifrons*, but he made the mistake of comparing western birds (typical *tectus*) with all eastern birds (both *tectus* and *latifrons*). Naturally, he could not differentiate between them.

Some specimens have no white on the outer web of the outermost primary as do most, but have the basal area pale brownish gray. Birds in fresh plumage have white tips to the middle upper wing coverts, which wear off and disappear rather rapidly.

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[92] Nov. Zool., vol. 29, 1922, p. 16.

[93] Journ. f. Ornith., 1910, pp. 311–312.

[94] Geol. and Zool. Abyss., 1870, p. 430.

[95] Journ. f. Ornith., 1905, pp. 67–68.

[96] Idem, 1914, p. 630.

[97] Ibis, 1915, p. 54.

Several of the specimens collected are molting the remiges. The molt begins at the carpal joint and proceeds distally in the primaries and proximally in the secondaries.

The series shows that the tail measurements as given by Hartert,[98] 90–100 millimeters, do not indicate the true limits of variation. The maximum is greater than any specimens I have examined, but 5 out of 12 birds have tails shorter than 90 millimeters. The smallest is 85 millimeters. Hartert's figures for the bill are 22–25 millimeters, while the birds examined measure from 22.5–27 millimeters in this respect.

Family SCOLOPACIDAE

CAPELLA NIGRIPENNIS (Bonaparte)

Gallinago nigripennis BONAPARTE, Icon. Faun. Ital., Ucc. fasc. 25, 1839: Cape of Good Hope.

Specimens collected:

Male, Arussi Plateau, 10,000 feet (3,000 meters), Ethiopia, February 27, 1912.

Soft parts: Bill brown, greenish at base; iris brown.

The single specimen collected is fully adult. It is somewhat larger than another female from Dangila, 40 miles south of Lake Tsana, Ethiopia, which, in turn, is labeled by the collector (R. E. Cheesman) as "* * * smaller than usual * * *." Aside from size, the birds differ in that the Arussi specimen has the chin and upper throat pure white while that from Dangila has only the chin unstreaked. Also the former is darker and more brightly marked above, but is in fresh plumage, whereas the latter is in worn condition.

This snipe is a bird of the plateau country of eastern and southern Africa.

In Ethiopia it occurs north as far as Adua in the Tigre district. Zedlitz[99] definitely says that it does not occur in the plateau of Asmara, and that Adua is probably the northern limit of its range. Various writers have shown that this species is a highland form; as for example, Erlanger[1] who writes that it occurs in the highland districts of Shoa; Neumann[2] who found it at Adis Abeba, while recently, Gyldenstolpe,[3] in the Kivu district, eastern Congo, met with it only in swampy places in the highest point of the plateau between Muhavura and Mgahinga, and between Mgahinga and Sabinio. Van Someren [4] has found it breeding at altitudes from 3,400 to 9,000 feet in Kenya Colony. The highest altitude from which the species has been recorded is 13,000 feet (3.900 meters) above sea level on Mount Elgon.[5] Granvik [5] writes that it, "* * * is a pronounced highland bird, which even occurs in the alpine region where only a few icy cold mountain streams can offer the bird the required possibilities of existence." While on the Smithsonian African expedition under the late Col. Theodore Roosevelt, Mearns collected an immature specimen at 12,500 feet (3,700 meters) on Mount Kenia. The British Ruwenzori expedition did not meet with it on Ruwenzori, but at 3,500 feet (1,050 meters), 80 miles west of Entebbe, and at Bosoko, Upper Congo River, 1,500 feet (450 meters). This last record can hardly be a breeding bird, as the altitude is too low.

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[98] Vög. pal. Fauna, p. 1564.

[99] Journ. f. Ornith., 1910, p. 321.

[1] Idem, 1905, pp. 77–78.

[2] Idem, 1904, p. 332.

[3] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 299.

The breeding season in Ethiopia is during June, July, and August.

The light streaks on the upper parts vary from tawny yellowish white to pale cinnamon. Two birds (unsexed) from South Africa represent the two extremes in this regard. Neumann [2] records a similar case in two males from Adis Abeba. The two South African birds differ from the two Ethiopian specimens examined in that the former have much broader white terminal bands on the under wing coverts, giving these feathers a white appearance as they lie in overlapping rows. If this character should be found to hold good and not be due to freshness or wear of the plumage, the southern birds may require separation.

Younger birds have the upper parts duskier, and less brightly marked, and the under parts more streaked with smaller pure white areas, than older individuals.

This species and *Capella media* are so similar superficially that it is quite possible that some of the published records are erroneous, but inasmuch as the two species occur together only during the northern winter, the chances for error are considerably reduced.

The four specimens examined measure as follows:

Locality	Sex	Wing	Tail	Culmen
Ethiopia:				
Arussi	♀	129. 0	59. 5	70. 5
Dangila	♀	133. 5	59. 0	69. 0
South Africa		129. 0	54. 0	73. 0
South Africa, Transvaal	♀	122. 0	52. 0	79. 0

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[2] Journ. f. Ornith., 1904, p. 332.

[4] Nov. Zool., vol. 29, 1922, p. 20.

[5] Granvik, Journ. f. Ornith., 1923, Sonderheft, p. 39.

PISOBIA MINUTA (Leisler)

Tringa minuta LEISLER, Nachtr. zu Bechst. Naturg. Deutschl., p. 74, 1812: Near Hanau, Germany.

Specimens collected:

Male and female, Djibouti, French Somaliland, November 22, 1911.

The present species is known to winter throughout the African continent, but as far as I have been able to learn, it has not been previously definitely recorded from French Somaliland. The record carries no great significance, however, as the bird is known to be abundant in Egypt, the Sudan, Arabia, and, in general, the whole Red Sea area. It has undoubtedly been taken or observed in French Somaliland on previous occasions, but no published records are known to me. It should be noted, however, that in his comprehensive survey of the bird life of southern Somaliland, Zedlitz[6] does not list this sandpiper. However, Bowen[7] records it as abundant on the Red Sea coast of the Sudan, not so very far from Djibouti. In the intervening area of Eritrea it probably occurs, but there are no published records. The nearest point to the south at which specimens have been taken is Berbera, British Somaliland. The range of this bird in the interior of northeastern Africa is also little known. The published records for Ethiopia are from Zulla[8] Cialalaka, Adua, and Gondar.[9]

In the Anglo-Egyptian Sudan it is better known. In northern Kenya Colony Ogilvie-Grant[10] records it from Lake Rudolf, while Van Someren[11] records it from many places farther south. Mearns noted three at Escarpment, on September 10, the last day of field work of the Frick expendition.

ACTITIS HYPOLEUCOS (Linnaeus)

Tringa hypoleucos LINNAEUS, Syst. Nat., ed. 10, vol. 1, p. 149, 1758: Europe; restricted type locality, Sweden.

Specimens collected:

Female, Adis Abeba, Ethiopia, December 30, 1911.

One unsexed, Adis Abeba, Ethiopia, January 1, 1912.

Male, Gato River near Gardula, Ethiopia, March 30, 1912.

Female, south end of Lake Rudolf, Kenya Colony, July 7, 1912.

Male, Tana River at mouth of Thika River, Kenya Colony, August 24, 1912.

Male, Athi River near Juja farm, Kenya Colony, August 31, 1912.

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[6] Journ. f. Ornith., 1914. pp. 608–678.

[7] Cat. Sudan Birds, 1926, p. 64.

[8] See Blanford, Geol. and Zool. Abyss., 1870, p. 433.

[9] Reichenow, Vög. Afr., vol. 1, pp. 233–234.

[10] Ibis, 1901, p. 297.

[11] Nov. Zool., vol. 29, 1922, pp. 19–20.

The bird collected on March 30 on the Gato River is in fresh summer plumage. Van Someren[12] writes that in Kenya Colony the assumption of the breeding plumage is not limited to any given period, some May specimens having not yet started to molt while others are in breeding plumage. This is corroborated by a long series of African examples of this sandpiper in the Museum of Comparative Zoölogy. The earliest date for full breeding plumage in the series is March 12 (Rhino camp, West Nile, Uganda), while one bird from the Blue Nile, Sudan, collected on January 24 was molting slightly when collected.

Not a few individuals seem to stay over the summer in Africa, although they do not breed there. Van Someren[12] writes that he is convinced that in the case of most migratory shore birds the late molting birds are the young of the previous summer, and many of these remain for a year in their winter homes. His records are corroborated by the bird Mearns collected early in July at the south end of Lake Rudolf. In the series before me is a July bird from Lumbo, Mozambique, a specimen that could hardly have gotten so far south at such an early date if it had been in the palearctic breeding grounds that summer. Likewise Grote[13] records the species all the year round in southeastern Tanganyika Territory.

The species has been found in practically all parts of Ethiopia and northeastern Africa generally. However the two main migration routes in that part of the continent seem to be the valley of the Nile and its tributaries, and along the Red Sea and the east coast. (This is based on the abundance of records in these two areas compared with the relative scarcity in the country in between them.) This does not mean that the species is actually uncommon in the interior of Ethiopia, as Mearns observed it in the following localities: From Djibouti on the Red Sea to Adis Abeba, the bird was seen on nearly every stream: Aletta, March 7–13, 1 bird; Loco, March 13–15, 2; Gidabo River, March 15–17, 2 seen; Abaya Lakes, March 18–26, 45; near Gardula, March 26–29, 4 seen; Gato River March 29 to May 17, 20 birds; Lake Rudolf and country adjacent to the southeast, July 5–10, 12 noted; Tana River, August 23–26, 110 birds; west of Ithanga Hills, August 28, 2; Athi River, August 31, 10 seen.

TRINGA OCHROPUS Linnaeus

Tringa ocrophus Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 149, 1758: Europe; restricted type locality, Sweden.

Specimens collected:

Two females, Adis Abeba, Ethiopia, December 30, 1911.

Two unsexed, Adis Abeba, Ethiopia, January 1, 1912.

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[12] Nov. Zool., vol. 29, 1922, p. 19.

[13] Journ. f. Ornith., 1912, p. 509.

Male, Arussi Plateau, 10,000 feet (3,000 meters), Ethiopia, February 27, 1912.

The green sandpiper is a regular winter visitor from the north in Ethiopia and Kenya Colony. Unlike the common sandpiper, *Actitis hypoleucos*, it prefers to a greater degree the high, inland, to the low, coastal districts. (Of course the latter also occurs inland, but not as commonly.) Thus, Blanford[14] writes that *ochropus* is common on the highlands, but not noted on the coast, while Mearns (as listed above) procured a specimen at 10,000 feet (3,000 meters) above the sea in the Arussi Plateau.

According to the authors of the Practical Handbook of British Birds,[15] the birds molt the body feathers, the rectrices, and some of the innermost secondaries and coverts between December and May. All the birds listed above should then be in molting condition. However, only one, from Adis Abeba, January 1, is molting, and in this case the molt is confined to the tail. All the specimens are in worn body plumage.

The molting bird and the other unsexed one collected with it are both subadult, and have the sides of the breast dusky like the mantle and have the middle of the lower throat and breast more abundantly and solidly streaked with brown than have the adults.

Occasional birds are found all the year round in Ethiopia, but there is no evidence that the species breeds there. Erlanger[16] recorded the first "summer" bird in that country, a specimen taken by Hilgert near Adis Abeba, August 4, 1900. However, bearing in mind the early date at which shore birds often begin their southward journeys, it is quite possible that this record may not be an individual that summered in Ethiopia. More recently Van Someren[17] noted that, in Kenya Colony, a few specimens were to be found all through the year.

Tringa ochropus is one of those sandpipers with an enormously wide geographic range that has not become locally differentiated into subspecies. Mathews[18] separated birds supposed to breed in Siberia and migrating to the Malay Archipelago on the basis of paler dorsal coloration (not darker as incorrectly stated by Hartert and Jackson), and slightly larger size. Hartert and Jackson[19] have shown that the size difference does not hold, neither does the color. The series from eastern Asia in the Museum of Comparative Zoölogy (3 specimens from India; 26 from China, Hupeh, Fukien, Szechwan,

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[14] Geol. and Zool. Abyss., 1870, p. 433.

[15] Vol. 2, pt. 15, 1922, p. 616.

[16] Journ. f. Ornith., 1905, p. 75.

[17] Nov. Zool., vol. 29, 1922, p. 19.

[18] Austral Av. Rec., vol. 1, p. 1888, 1913.

[19] Ibis, 1915, p. 534.

Yunnan, and Kiangsu) substantiates their conclusions. The results are further corroborated by Gyldenstolpe,[20] who measured a series of eastern and of western birds and found them exactly alike in size; wings 136 to 146 millimeters in each case. Shore birds vary greatly in size, and it is therefore dangerous to describe races based on this character unless long series of breeding birds with full data are available.

This species was met with in the following places: Hawash River (Errer to Sadi Malka), not common; Gidabo River, March 15–17, 2 seen; Abaya Lakes, March 18–26, 46 birds noted.

GLOTTIS NEBULARIA (Gunnerus)

Scolopax nebularius GUNNERUS, in Leem, Beskr. Finm. Lapp., p. 251, 1767: Norway.

Specimens collected:

Female, Djibouti, French Somaliland, November 22, 1911.

The specimen collected is in winter plumage.

The greenshank is a common migrant along the Red Sea, where Heuglin and others noted it in numbers from August to April. However, the present specimen seems to be the first definitely recorded from French Somaliland, although the species was long known to occur in that general region. The species also occurs inland as well, and has been recorded from many places in Africa south to the Cape Province.

In his notes Mearns recorded this bird as numerous at Djibouti.

RHYACOPHILUS GLAREOLA (Linnaeus)

Tringa glareola LINNAEUS, Syst. Nat., ed. 10, vol. 1, p. 149, 1758: Europe; restricted type locality, Sweden.

Specimens collected:

Two females, Gidabo River, 3,700 feet (1,100 meters), Ethiopia, March 17, 1912.

Both specimens are in prenuptial molt. Many of the body feathers and upper wing coverts are new, but the crown, occiput, and breast are still covered by old winter feathers. The spring molt in this species is not complete, but involves the body feathers, some of the upper, middle, and lesser wing coverts, the tail, and some of the innermost secondaries. To judge from a considerable series of African examples taken between December and late May, the molt begins with the feathers of the back, scapulars, and wing coverts, then the tail and innermost secondaries, and finishes with the back of the head and neck, and the breast. Thus, a bird from western Uganda taken on April 8, has only begun to molt on the back and upper wing coverts, while another from near by (Lake Edward, eastern Belgian Congo) May 7, is in complete fresh summer plumage. There is no fixed date at which all birds in a given region molt however; as another bird from western Uganda, April 7, is also finished molting.

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[20] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 300.

The wood sandpiper is a regular and numerous migrant to Africa, extending its range in winter south to South Africa. It seems, however, to be less abundant than the green sandpiper (*Tringa ochropus*) or the common sandpiper (*Actitis hypoleucos*). It occurs both on the coast and along streams and ponds in the interior, chiefly the latter.

The two specimens collected are small, having wings measuring 120 and 122 millimeters, respectively. The minimum size given by Hartert[21] is 124 millimeters.

Mearns recorded having seen 35 of these birds at the Abaya Lakes, March 18–26.

Family RECURVIROSTRIDAE

HIMANTOPUS HIMANTOPUS (Linnaeus)

Charadrius himantopus LINNAEUS, Syst. Nat., ed. 10, vol. 1, p. 151, 1758: Southern Europe.

Specimens collected:

Two males, Arussi Plateau, 11,000 feet (3,300 meters), Ethiopia, February 18, 1912.

Soft parts: Iris red; bill black; legs and feet pink.

Specimens from Madagascar were separated from the typical African form by Bangs[22] on the basis of smaller size. The wing length of the Madagascan birds is given as 220 to 237 millimeters, average 226 millimeters. I have remeasured the same series (11 specimens) that Bangs studied, and find that the wing varies from 206 to 242 millimeters, and that of the 11 individuals, 6 have wings more than 230 millimeters long. An equal series of adults (12 specimens) from the mainland of Africa, Europe, and Palestine, have wing lengths (regardless of sex) of from 236 to 246.5 millimeters. It follows that the wing length is obviously not a valid basis for subspecific differentiation. Likewise, taking only birds in full adult plumage, the Madagascan examples have, as a rule, considerably shorter tarsi than those from Africa, Europe, and Palestine, but the limits of the two overlap, but to a lesser extent than in the case of the wing length.

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[21] Vög. pal. Fauna, p. 1620.

[22] Bull. Mus. Comp. Zoöl., vol. 61, 1918, pp. 493–494.

Madagascan adults have tarsi 102 to 119 millimeters in length, while mainland specimens measure 108 to 135 millimeters. Of 11 adults from Madagascar all but 2 have tarsi as long as some African birds, while of 17 mainland specimens, 7 have tarsi as short as the largest Madagascan individuals. The maximal limits of the two are very different. It is true that the latter birds average smaller, but the difference is not very well defined. It must be admitted, however, that not a few races of North American birds are based on just such vague, general differences.

Even if the Madagascan bird should be separated, the name used by Bangs, *Hypsibates himantopus minor*, is not applicable. Sclater[23] has shown that this name (not *Hysibates* as quoted by Sclater) dates from 1860[24] and is preoccupied by *Himantopus minor* Brehm,[25] which is a direct synonym of *Charadrius himantopus* Linnaeus.

Lest it seem from the above that the question of the Madagascar stilts is definitely settled, it should be mentioned that the sexing of the available material from that island is none too reliable, and the adult males from the mainland of Africa, Europe, and eastern Asia are definitely larger than the Madagascan birds.

Both specimens collected have the crown and occiput blackish gray, and the hind neck light grayish.

A single bird was seen, but not collected, on March 18 at Lake Abaya.

Heuglin[26] records this bird as breeding on Lake Tsana, Ethiopia, as well as in Nubia, Sennar, and eastern Kordofan.

Family OEDICNEMIDAE

OEDICNEMUS SENEGALENSIS ASSIMILIS Bädeker

Oedicnemus assimilis Bädeker, Journ. f. Ornith., vol. 1, 1853, Extra-Heft, 1854, p. 117: Eastern Sudan.

Specimens collected:

Male adult, Sadi Malka, Ethiopia, December 21, 1911.

Female adult, Sadi Malka, Ethiopia, January 28, 1912.

One unsexed, Sadi Malka, Ethiopia, January 29, 1912.

Male adult, female adult, Hawash River, Ethiopia, February 11, 1912.

Female adult, Hawash River, Ethiopia, March 3, 1912.

Female adult, Lake Abaya, Ethiopia, March 19, 1912.

Male adult, Sagon River, Ethiopia, June 4, 1912.

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[23] Bull. Brit. Orn. Cl., vol. 42, 1922, p. 73 [not 43 as in footnote, Syst. Avium Ethiop., 1924, p. 128].

[24] Hartlaub, Journ. f. Ornith., 1860, p. 170.

[25] Isis, 1843, p. 727: Hungary.

[26] Orn. Nordost Afr., vol. 22, 1873, p. 1177.

Soft parts: Iris yellow; bill black, greenish yellow at base except along commissure and on ridge of maxilla at base; feet greenish yellow; claws black.

In the study of this and the other species of stone curlews I have used Mrs. Meinertzhagen's review of the group [27] as a basis. Other workers had previously revised the systematics of these birds in whole or part, notably Erlanger,[28] Zedlitz,[29] Grant,[30] and Hartert,[31] but the material in the Museum of Comparative Zoölogy agrees best with the conclusions reached by Mrs. Meinertzhagen.

Sclater [32] does not recognize *assimilis*, but the reason is probably that only freshly plumaged specimens exhibit the racial characters, while worn birds are quite indistinguishable from specimens in similar condition of typical *senegalensis*. However, in fresh plumage *assimilis* has the upper parts grayer and the edges and markings of these feathers paler buff, less cinnamomeous, than in *senegalensis*. The two races are perfectly good and readily distinguishable. Their ranges are as follows:

O. s. senegalensis: Western Africa from Senegal to Loango, east to Gold Coast, Nigeria, Cameroon, and French Ubangi.

O. s. assimilis: Egypt, Ethiopia, Eritrea, Anglo-Egyptian Sudan, and extreme northern Uganda and the Turkana country west of Lake Rudolf (Kebua and Meuressi).[33]

The two races meet in the Lado Enclave, whence both are recorded.

The young birds resemble the adults but have the pectoral streaks narrower, and the edges of the feathers of the upper parts, particularly the wing coverts, paler.

The extent of the white patches in the three outermost primaries varies considerably, but wholly in an individual manner, in adult birds. In one female the patch on the third primary from the outside is restricted to a small area extending for half the width of the outer web and about 25 millimeters long, while the inner web has only a slightly larger white area on its inner edge. In other words, there are two small patches of white in this feather, whereas in most specimens there is one continuous white area across the feather.

Oedicnemus inornatus Salvadori [34] was described from Ethiopia and is therefore a synonym of *assimilis*, not of typical *senegalensis*, as Mrs. Meinertzhagen [35] has recorded it.

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[27] Ibis, 1924, pp. 329–356.

[28] Journ. f. Ornith., 1905, pp. 68–74.

[29] Idem, 1910, pp. 313–317.

[30] Ibis, 1915, pp. 62–63.

[31] Vög. pal. Fauna, pp. 1517–1522.

[32] Syst. Avium Ethiop., 1924, p. 142.

[33] See Van Someren, Nov. Zool., vol. 29, 1922, p. 17.

[34] Atti Soc. Ital. Sci. Nat., vol. 8, 1866, p. 381.

[35] Ibis, 1924, p. 340.

A series of 24 specimens of this species indicates that there is no constant difference in size between the 2 races, but the measurements for the typical, western form average smaller, a result agreeing with the data presented in Mrs. Meinertzhagen's review.

O. s. senegalensis:

Male: Wings 205–220, tail 110–114, culmen 42.5, tarsus 66.5–69 millimeters.

Female: Wings 210, tail 114, culmen 42.5, tarsus 67.5 millimeters.

Unsexed: Wings 198–214.5, tail 102–111.5, culmen 43–48.5, tarsus 69–72.5 millimeters.

O. s. assimilis:

Male: Wings 212–228, tail 105–121, culmen 42–46, tarsus 64–71 millimeters.

Female: Wings 209–224, tail 113–125.5, culmen 41–44, tarsus 61.5–71 millimeters.

Unsexed: Wings 211–220, tail 113–118, culmen 41–44, tarsus 63–69 millimeters.

The male and female collected at the Hawash River, on February 11, were a mated pair, and the female from Lake Abaya, March 19, contained an enlarged egg, both signs that the breeding season in Ethiopia is during March and April.

Besides the specimens obtained, Mearns saw 24 of these birds at the Abaya Lakes, March 18–26, and 2 at Bodessa, June 3–6.

OEDICNEMUS CAPENSIS AFFINIS Rüppell

Oedicnemus affinis RÜPPELL, Mus. Senck., vol. 2, p. 210, 1837: Kordofan.

Specimens collected:

Male and female, 18 miles south of Hor, Kenya Colony, July, 1912.

In her review of this group [36] Mrs. Meinertzhagen considers *affinis* as a synonym of *maculosus*, as does also Hartert.[37] Sclater [38] and Lynes [39] recognize *affinis*. I have seen no material of *maculosus* and I therefore adhere to my policy of following Sclater's list in all cases that I have not been able to study for myself. Sclater calls Kordofan the type locality of *affinis*, but this procedure is open to question. Rüppell wrote the range of the bird as Ethiopia, Nubia, and Kordofan, but his specimens actually came from the Red Sea coast of Ethiopia or Eritrea. Hartert, in noting this, writes that the figure in "* * * Syst. Uebers. Vög. N. O. Afr. pl. 42, seems * * * to represent a bird different from the brightly colored ones from the Senegal, Gambaga, Asben, Upper Nile and White Nile, with which also one from Eritrea agrees." In his review Zedlitz [40] writes that one of Rüppell's two types agrees with the plate, the other being juvenal, and therefore that the bird figured must serve as the type.

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[36] Ibis, 1924, pp. 343–346.

[37] Nov. Zool., vol. 28, 1921, p. 88.

[38] Syst. Avium Ethiop., 1924, p. 142.

[39] Ibis, 1925, p. 559.

[40] Journ. f. Ornith., 1910, p. 314.

The two specimens collected by Mearns certainly agree with Rüppell's colored figure and differ from typical *capensis* (which occurs farther south in Kenya Colony) in being generally lighter, less widely streaked on the breast, and less heavily spotted above. The difference, however, is not great. This record is of interest in connection with Van Someren's statement [41] that Zedlitz's suggestion that this form ranges to the Victoria Nyanza needs verification, but that birds from Baringo and Lake Rudolf may belong to this race. It seems quite probable that the birds of the Lake Rudolf and Baringo country are *affinis*, but I should hesitate to claim the same for those of Lake Victoria. Birds from the Guaso Nyiro and from Nairobi are typical *capensis.*

As far as the material examined goes, the distributional data presented by Sclater [38] seem correct, except that *affinis* ranges farther south than he indicates—as far as Lake Rudolf.

A young bird of the typical race in late postnatal molt (from Singida, Tanganyika Territory, A. Loveridge collection) indicates that the natal down of the upper parts is pale, dull, tawny gray, with pale tawny tips, while that of the under parts is pure white except on the throat and upper breast where the neossoptiles are subterminally banded with dusky grayish brown. The juvenal plumage resembles that of the adult except in having the feathers of the upper parts and wing coverts with wide dark brown shaft streaks, not with coarse, heavy spots as in adults.

This species was observed as follows: Hor, June 26–30, 6 seen; dry river south of Hor, July 1–2, 2 birds; Lake Rudolf and country immediately to the southeast, July 5–10, 35 seen; Northern Guaso Nyiro River, July 31 to August 3, 4 noted; Lekiundu River, August 4–8, 4 birds.

OEDICNEMUS VERMICULATUS VERMICULATUS Cabanis

Oedicnemus vermiculatus CABANIS, Journ. f. Ornith., 1868, p. 413: East Africa; i. e., Lake Jipe, near Teita, Kenya Colony (see Finsch and Hartlaub, Vög. Ostafr. p. 623).

Specimens collected:

Male, Tana River, opposite mouth of Thika River, Kenya Colony, August 23, 1912.

According to Mrs. Meinertzhagen's [42] review of this genus and Sclater's list [43] there are two races of this bird; the typical, eastern form, and a darker, grayer, western one, *büttikoferi*. Mrs. Meinertzhagen gives the range of the latter as Liberia, and suggests, on the basis of four specimens from Gaboon, that the birds of the latter area are intermediate. Sclater, on the other hand, gives the range of *büttikoferi* as Liberia east to Uganda. Through the courtesy of Dr. C. W. Richmond I have had the opportunity of examining six birds from Gaboon in the United States National Museum (Aschemeier collection), and have assembled a series as well from eastern Africa. My conclusions agree with those reached by Sclater, namely, that the dark-backed form occurs east to the Congo-Uganda border. However, the Gaboon and Congo specimens have shorter bills than Liberian birds. Reichenow[44] gives the bill length of Liberian specimens as 50 to 53, while Mrs. Meinertzhagen records 54 millimeters for her specimen. The six Gaboon birds measure 45–47 (female), 46–48 millimeters (male), the one from the eastern Belgian Congo (female) 41.5 millimeters; eastern birds (Kenya Colony and Tanganyika Territory), 41–43 (female), 41–43.5 millimeters (male). It seems from the above measurements that the dark dorsal coloration is a better racial criterion than the length of the bill. The situation may be summed up as follows: There are two races of *O. vermiculatus*, a dark-backed western one, which decreases in length of the culmen from west to east, and a browner, lighter-backed, eastern race which has a small bill throughout its range. *O. v. büttikoferi* presents no sudden jump in bill length that may be correlated with geography, and can not therefore be subdivided on the basis of size.

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[38] Syst. Avium Ethiop., 1924, p. 142.

[41] Nov. Zool., vol. 29, 1922, p. 17.

[42] Ibis, 1924, pp. 341–343.

[42] Syst. Avium Ethiop., 1924, p. 143.

In the typical race females average darker and more heavily vermiculated than males, but in the western form they do not. Probably the latter race would be interpreted by some of the students of differential sex metabolism as a female type of race, the males having achieved the same degree of pigmentary intensity as the females, and both having developed this tendency still more than the females of the eastern subspecies.

The measurements given by Mrs. Meinertzhagen are open to modification, particularly with respect to their minima. The smallest birds in the series available are as follows: Male, wing 196, tail 98, culmen 41.5; female, wing 195, tail 104.5, culmen 43 millimeters.

Erlanger[45] considered the eastern birds separable into two races, a northern form with a yellowish sandy tone to the upperparts, and a southern form with browner back. The first occurs in Somaliland, the second throughout eastern and southern Africa. Under the impression that Von der Decken's type came from Somaliland, Erlanger called the northeastern birds *vermiculatus*, the eastern and southern ones *gularis*. Zedlitz[46] showed that the type of *vermiculatus* came from Lake Jipe, Kenya Colony, and not from Somaliland, and, although birds from this region were considered the same as southern ones by Erlanger, Zedlitz merely extended the southern limits of *vermiculatus* to take in Lake Jipe (and therefore incidentally all of Kenya Colony). However, the differences between *vermiculatus* and *gularis* are certainly not constant. In the series assembled for the present study are birds of both plumage types from the same localities. It is therefore unwarranted to separate two races of the eastern form of *O. vermiculatus.* It should be mentioned, however, that I have seen no material from Somaliland or Ethiopia.

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[44] Vög. Afr., vol. 1, pp. 201–202.

[45] Journ. f. Ornith., 1905, pp. 69–72.

Besides the single bird collected, Mearns observed eight others at Athi River, August 30 to September 1.

Family GLAREOLIDAE

RHINOPTILUS AFRICANUS RAFFERTYI Mearns

Rhinoptilus africanus raffertyi MEARNS, Smiths. Misc. Coll., vol. 65, No. 13, p. 7, 1915: Iron Bridge, Hawash Valley, Ethiopia.

Specimens collected:

Male, (type) Iron Bridge, Hawash Valley, Ethiopia, February 4, 1912.

Male immature, Gabra Dulcha, Ethiopia, January 25, 1912.

Sclater[47] considers *raffertyi* as a probable synonym of *hartingi.* In this he is mistaken as the former is much grayer above, blacker, less cinnamon buffy on the crown than the latter. It is much less reddish than the figure of *hartingi* in the Catalogue of Birds in the British Museum[48] and than a specimen from Ahdeh, Somaliland (A. Donaldson Smith collection) in the United States National Museum.

This species has eight recognizable races with the following geographical ranges.

1. *R. a. africanus.*—Southwestern Africa east to the Karroo district of the Cape Province, north through Namaqualand; characterized by pinkish inner primaries, buffy white abdomen, and having the throat finely and sparsely streaked. This and the next two races are dark brown above.

2. *R. a. sharpei.*—Ovampoland; similar to *africanus* but with the abdomen whiter, less buffy, and the throat streaks even finer.

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[46] Journ. f. Ornith., 1914, pp. 630–631.

[47] Syst. Avium Ethiop., 1924, p. 138.

[48] Vol. 24, 1896, pl. 2.

3. *R. a. granti.*—Karroo district of Cape Province north to the Orange Free State and the Transvaal; darker than *africanus*, the throat streaks heavier, the abdomen rufous buff, the inner primaries more rufous in color.

4. *R. a. bisignatus.*—Angola; characterized by small size (wing 133–142 as against 147–161 millimeters in *africanus*) and pale coloration.

5. *R. a. illustris.*—Central Tanganyika Territory; nearest to *bisignatus* but paler, less rufous, more grayish.

6. *R. a. gracilis.*—Dry inland districts of Kenya Colony and northern Tanganyika Territory; characterized by a combination of characters; small size as in *bisignatus* and *illustris* and darker coloration (not as dark, however, as in *africanus*, *sharpei*, or *granti*).

7. *R. a. hartingi.*—Somaliland; a very rufous race with the size characters of *bisignatus*, *illustris*, and *gracilis.*

8. *R. a. raffertyi.*—Hawash district, Ethiopia; size as in *hartingi*, but much less rufous, more grayish above, much darker; differs from *bisignatus* in being less tawny on the breast and on the back, and grayer above.

The type is in somewhat worn plumage, while the other is fresh and has wider light margins to the feathers of the upper parts. The difference is particularly noticeable on the crown, the absence of light edgings giving the type a darker looking head than the paratype. The upper wing coverts of the type are new, and contrast markedly with the worn scapulars and interscapulars.

The measurements of the two birds are as follows: Type—wing 147, tail 63, culmen 14, tarsus 46 millimeters. Paratype—wing 137, tail 61, culmen 14, tarsus 45 millimeters.

Apparently these two birds constitute the sole records for the species in Ethiopia, and the only known specimens of *raffertyi* in existence.

RHINOPTILUS CINCTUS CINCTUS (Heuglin)

Cursorius cinctus Heuglin, Ibis, 1863, p. 31, pl. 1: Gondokoro.

Specimens collected:

One unsexed, Ourso, Ethiopia, October 19, 1911.
One female, Dire Daoua, Ethiopia, December 17, 1911.
One unsexed, Tertale, Ethiopia, June 8, 1912.
One female Malata, Ethiopia, June 22, 1912.
Male and female, Endoto Mountains, Kenya Colony, July 21, 1912.

The Ourso specimen was collected by A. Quellard and sold to the expedition by him. That from Dire Daoua was presented by H. and F. von Zülow, who collected it there.

Although this species was first described in the Ibis for 1863, the name was published by Heuglin seven years previously[49] and the locality of the single specimen was given as Bahr el Abiad (that is, White Nile).

Erlanger[50] was the first worker to study the systematics of this bird and he was unable to come to any definite conclusions because he used as taxonomic characters the amount of gray or rufous in the upperparts, characters now known to be correlated with age. He, however, considered *seebohmi* and *cinctus* identical, and used the former name although the latter had priority. Zedlitz[51] has made the most careful study of the races of this bird, and, in lieu of adequate series, I accept his work as a basis. According to him there are three races, as follows:

R. c. cinctus.—Northern Somaliland, Ethiopia, White Nile, Southern Somaliland, Kenya Colony, and northeastern Tanganyika Territory (east and southeast of Lake Victoria).

R. c. emini.—Ukerewe Island, Lake Victoria, and the districts to the south and west of the lake.

R. c. seebohmi.—Southwest Africa to Mossamedes (later shown by others to occur also in Southern Rhodesia and northwest Rhodesia as well).

The characters of the races are those of tarsal length and color of the outer three pairs of rectrices, as follows:

R. c. cinctus.—Tarsus 57–64 millimeters; outermost rectrix white, second banded with white; third with some white.

R. c. emini.—Tarsus 63–66 millimeters; outermost rectrix white, second only partly white, chiefly on the outer web; third with no white.

R. c. seebohmi.—Tarsus 68–70 millimeters; outermost rectrix whitish, second with only a few white flecks on the outer web; third with no white.

In other words, northern birds have the shortest tarsi and the most white in the tail, southern birds have the longest tarsi and the least white in the tail, and birds from in between, are intermediate in character.

The present series are all typical *cinctus*, having tarsi 58 to 64 millimeters in length, and with white present on the three outer rectrices. The amount of white on the second and third rectrices is quite variable; the white is often replaced by light buffy on the outer web of the third rectrix.

Besides the birds listed above I have seen two specimens (male and female) of *emini* from Mkalama (Zengeragusu and Usshoro), Tanganyika Territory. The male is intermediate between *emini* and *seebohmi*, agreeing with the former in the tail pattern, and with the latter in the tarsal length (72 millimeters). It may therefore be suggested as a possibility worth investigating that *seebohmi* ranges farther east than hitherto suspected—through northern Rhodesia and Nyasaland into Tanganyika Territory where intergrades between it and *emini*, such as the Mkalama specimen, occur. I have seen no typical *seebohmi* material.

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[49] Sitz. K. Akad. Wiss. Wien, vol. 19, 1856, p. 306.

[50] Journ. f. Ornith., 1905, p. 60.

[51] Idem, 1914, pp. 622–625.

The bird from Ourso is subadult. It is much grayer than the adults; the feather edgings are more whitish; the outer rectrices are pure white, lacking transverse bars on their inner webs (which some of the adults have); and the transverse bars of the undersurface are interrupted and obscure.

Adult birds vary greatly in the coloration of the sides of the heads. Some have a well-defined black postocular line immediately beneath the posterior part of the white superciliary, while others have it so poorly developed as to be practically wanting. The streaked pectoral area also varies in redness and in the size and intensity of the dark streaks.

The adult female taken at Malata on June 22 was one of a mated pair that were flushed from under some thorn bushes. Its mate escaped. The latter and the specimen collected were the only individuals seen on the entire trip. It is rather curious that a pair (? the sex of the other bird merely surmised by Mearns) should have been seen late in June, as the only indication of the breeding season of this bird in Ethiopia that has come to my notice is Hilgert's discovery (reported by Erlanger,[50]) of two eggs on January 9 at Gololotta, Arussi-Gallaland. Loveridge [52] found an egg at Zengeragusu, Mkalama, Tanganyika Territory, on November 2. This record, although published as *R. c. cinctus* really refers to *R. c. emini*. Incidentally, the bird taken with the egg is in the dark gray subadult plumage, a sign that the species breeds in that stage.

The largest of the six birds collected is a female with the following measurements: Wing 166, tail 91.5, culmen 20, tarsus 59 millimeters. It is strange that the tarsal length varies without any definite correlation to the size of the other parts of the body, as the bird with the longest tarsus (64 millimeters) presents the following other measurements: Wing 159.5, tail 83, culmen 18.5 millimeters. The Mkalama specimen with very long tarsi (72 millimeters) measures otherwise as follows: Wing 156.5, tail 82.5, culmen 18 millimeters.

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[50] Journ. f. Ornith., 1905, p. 60.

[52] Proc. Zool. Soc. Lond., 1923, p. 921.

GLAREOLA PRATINCOLA LIMBATA Rüppell

Glareola limbata RÜPPELL, Syst. Uebers. Vög. N. O. Afr., p. 113, 1845: Djeddah and Massowa.

Specimens collected:

One male adult, Chaffa, Kenya Colony, June 24, 1912.

Three male adults, three young males, and three young females, Hor, Kenya Colony, June 26–30, 1912.

Two male adults, one female adult, and one young female, Lake Rudolf, east, Kenya Colony, July 5, 1912.

Soft parts: Iris, dark brown; bill, black, red at base on sides and below; feet, grayish brown; claws, black; in juvenal birds the base of the bill and angle of mouth are deeper, brighter red than in adults.

This pratincole has had a rather stormy nomenclatural history. The species was originally named *Hirundo pratincola* by Linnaeus [53] and was known by this name until Sharpe suggested that *Tringa fusca* Linnaeus [54] was the same as *Hirundo pratincola* Linnaeus. Reichenow [55] accordingly called the bird *Glareola fusca* and, as his work was the basis for many subsequent papers, this name came into extensive usage. However, Hartert [56] showed that the name *fusca* was based on a description (taken by Linnaeus from Brisson) which is not identifiable and which certainly does not refer to the present species. The original name *pratincola* then was restored to use.

Originally the species was thought to breed only in Europe and to migrate to Africa, and consequently European and African birds were all considered the same. It was later shown that while European birds did migrate to northern Africa, there was also a resident African form. The two forms were distinguished for the first time in 1905 when Erlanger [57] pointed out that the resident northeast African birds were smaller and somewhat darker above than the European migrants, and applied the name *limbata* Rüppell to the former. The situation now becomes further involved because the name *limbata* is based on an immature bird, as Rüppell considered young birds as a different species from adult ones. Hartert [58] pointed this out, apparently as a new discovery, although Blanford [59] anticipated him by 21 years. When accepting the name *limbata* for the resident bird of northeastern Africa, Erlanger seems to have been confused himself as to the difference between young and old birds of this species. The name, however, must hold for the resident form of northeastern Africa, as Heuglin's material came from there, although the characters on which he based *limbata* mean nothing.

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[53] Syst. Nat., 12 ed., vol. 1, p. 345, 1766.

[54] Idem, p. 252.

[55] Vög. Afr., vol. 1, p. 144.

[56] Nov. Zool., vol. 23, 1916, p. 89.

[57] Journ. f. Ornith., 1905, p. 55.

[58] Kat. Vögels. Mus. Senckenberg., 1891, p. 218.

[59] Geol. and Zool. Abyss., 1870, p. 430.

Since 1905 the resident African birds have been found to include three rather slightly differentiated, but yet recognizable, forms, as follows:

1. *Glareola pratincola limbata.*—Senegal to the Sudan, Ethiopia, British Somaliland, and southern Arabia.

2. *Glareola pratincola fülleborni.*—Eastern Belgian Congo, Uganda, and Kenya Colony, south through Tanganyika Territory and Mozambique to South Africa (Natal and Cape Province).

3. *Glareola pratincola erlangeri.*—South Somaliland coastal area.

The limits of the ranges of all three are still poorly understood as the races are very similar and very few distributional data based on breeding birds are available. The present series from extreme northern Kenya Colony are here referred to *limbata* but are in reality intermediate between this form and *fülleborni* although nearer the former. Van Someren[60] has recorded the latter as far north as Lake Rudolf.

In studying the specimens collected by Mearns, I have assembled a series of some 63 birds representing all the races of this species except *erlangeri*. The Asiatic form *maldivarum* is here considered with the races of *pratincola* as it is obviously closely related although probably a distinct species as Hartert[61] has rated it. The material indicates that *limbata* is by far the least certain of all the forms, and is only doubtfully distinct from the typical race. The darker color of the former and its somewhat smaller size are only average differences.

The immature birds collected by Mearns indicate that the males are darker than the females in this stage. Two young males, taken at Hor, Kenya Colony, June 26 and 30, have the forehead, crown, back, and wings spotted or edged with golden buff. The anterior underparts are washed with clay color, the lower throat striped with black, and the chest heavily spotted with black. On the other hand, two young females of about the same age, from Hor, June 26, and Lake Rudolf, July 5, differ in being paler and drab above, the feathers edged and spotted with buff, and with the throat plain pale clay color bordered below by a broken ring of blackish spots succeeded on the chest by a broad, grayish area containing a few darker spots and paler edgings to the feathers. An older female, from Hor, June 30, is darker, more olivaceous than fully adult birds, and has very narrow buffy edges to the feathers of the upper parts, and differs from every other specimen in the collection in having the entire throat heavily striped with black; it is, in fact, exactly like the figure of *Glareola melanoptera* (=*nordmanni*) in Dresser's "Birds of Europe,"[62] but has the under wing coverts and axillars mostly chestnut. A still later stage of plumage, represented by two females from Hor, June 30, differs from the adult only in having the upper parts darker, with very faint buffy edges to the feathers, and the ring bordering the plain buff throat broken up into a row of black spots.

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[60] Nov. Zool., vol. 29, 1922, pp. 11–12.

[61] Vög. pal. Fauna, p. 1529.

In freshly plumaged adults the black ring on the throat is bordered exteriorly (that is, caudally and laterally) with white, the border being due to the white tips of the feathers composing the black line. These tips wear off, and in older plumages the white outer ring is correspondingly lacking.

The darkness of the inner under wing coverts is considered a reliable difference between *limbata and fülleborni*, but in the two young males mentioned above, these feathers are darker in one than in the other, and in the darker of the two, they match in shade those of *fülleborni* from the eastern Congo. Some idea of the limits of size variation of *limbata* may be obtained from the measurements of the six adult males: Wing, 172–190; tail, 105–120; culmen, 18–19.5; tarsus, 26–29. The single adult female measures as follows: Wing, 180; tail, 103; culmen, 18.5; tarsus, 28 millimeters.

Although *limbata* is said to be a resident race in Ethiopia, it is not improbable that some of the birds have a partial western altitudinal migration to the valley of the Nile during the nonbreeding season. Lynes[63] writes that both *pratincola* and *limbata* winter on the Nile.

Family LARIDAE

LARUS FUSCUS FUSCUS Linnaeus

Larus fuscus Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 136, 1758: Europe, restricted type locality, Sweden (Hartert).

"Numerous in the harbor at Djibouti." (E. A. Mearns.)

Neumann[64] records two gulls from Hora Schale, November 30, as "*Larus f. affinis* (?)." These probably are *Larus fuscus fuscus*.

In view of the fact that Mearns found this gull to be common at Djibouti it is noteworthy that Zedlitz[65] writes that *Larus fuscus* is apparently very uncommon or very local in the Red Sea. He saw it only in the harbor of Massowa.

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[62] Vol. 7, pl. 513.

[63] Ibis, 1925, p. 560.

[64] Journ. f. Ornith., 1904, p. 325.

[65] Idem, 1910, p. 297.

HYDROCOLOEUS CIRRHOCEPHALUS POIOCEPHALUS (Swainson)

Larus poiocephalus SWAINSON, Birds West Africa, vol. 2, 1837, p. 245: No type locality; probably "West Africa."

Specimens collected:

One male adult, three female adults, Lake Rudolf, Kenya Colony, July 5, 1912.

One female adult, Lake Rudolf, Kenya Colony, July 6, 1912.

One female adult, extreme south end Lake Rudolf, Kenya Colony, July 7, 1912.

Soft parts: Iris, white; eye ring, bill, and feet, red; claws, dark brown.

Dwight[66] adopts the name *phaeocephalus* Strickland and Sclater for the African race of the gray-hooded gull, but this name was proposed[67] as an emendation of Swainson's name *poiocephalus.* While it is true that *poiocephalus*, as spelled, has no meaning, and was probably intended to be written *poliocephalus*, nevertheless it has to stand. Names as such are of importance only as handles by which to deal with species and it makes little or no difference if the name has any inherent meaning or not. Emendations have no nomenclatural standing, and are merely signs of the pedantic tendencies of their authors. If names had to really mean something, a large part of the so-called barbaric or native names would have to be discarded, as many of them are undoubtedly incorrectly transcribed. In the original description of *poiocephalus* Swainson mentions no type locality, nor does he say whence came his specimens. I assume that "West Africa" would have to be considered as the type locality of the African gray-hooded gull although the bird is known to breed only in the central African lakes and not along the coast.

The range of this bird as given by Sclater[68] needs modification as regards its northeastern limits. He records it north only to Lakes Edward and Victoria, but it occurs north well into Ethiopia, where it has been taken on Lake Afjada.[69]

Dwight[66] writes that the breeding season reaches its climax in July or August in Africa, and in October and November in South America. In its molts as well the typical form is several months later in the year than the African race, a rather curious discrepancy. In Africa the postjuvenal molt takes place from September to December, the prenuptial molt in March, April, and May, the postnuptial, September to January. The present series confirms Dwight's dates, all the birds being in full nuptial plumage, some quite worn, others much fresher.

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[66] Bull. Amer. Mus. Nat. Hist., vol. 52, 1925, p. 270.

[67] List Birds Damaraland, in Jard. Contrib. Orn., 1852, p. 160.

[68] Syst. Avium Ethiop., 1924, p. 145.

[69] Erlanger, Journ. f. Ornith., 1905, p. 44.

One specimen in the Museum of Comparative Zoölogy, an unsexed bird from Mwanza, Tanganyika Territory (A. Loveridge collection) is in second winter plumage, according to Dwight's terminology, but nevertheless it has a few juvenal (brownish) upper lesser coverts on each wing. It looks as though the bird retained those feathers for two years, but, of course, it is impossible to be certain. If true, it is a most remarkable period of feather retention.

As recently as 1915 the breeding place, nest, and eggs of this gull were unknown. Thus Grant[70] wrote that—

> * * * it is worthy of note that, so far as I can learn, the exact breeding place of this bird is not known, and the eggs have not yet been described * * *. Sir Frederick Jackson says that this gull breeds commonly on Lake Naivasha, but I have not been able to examine eggs in support of this.

While with the Smithsonian African expedition under Col. Theodore Roosevelt, Mearns found this gull breeding in numbers at Lake Naivasha, and later, while with the Frick expedition he found it nesting abundantly on Lakes Stefanie and Rudolf. Shortly before his death, Mearns began a paper on the habits of this gull, based on his experience with it on both expeditions. This manuscript, which was never even approximately finished and rounded out, was found together with his notes on the present collection, and I here quote a few paragraphs from it, as it is still the best account of the habits of this bird.

> It was with feelings of delight that we reached the south shore of Lake Naivasha from the dry and dusty Loita Plains south of the southern N'Guaso Nyiro River. The green basin of Naivasha was refreshing by constrast, and all the more interesting to the members of Colonel Roosevelt's hunting party because it was the first fresh-water lake that we visited. We spent the first night beside a stretch of sandy beach, at either end of which the rank growth of papyrus claimed the shore line almost around the lake. Shore birds ran upon the beech, and crested coots, moorhens, and grebes, together with many ducks swam among the lily leaves and other aquatic vegetation; and the pretty jacanas ran gracefully upon the large leaves of the blue water lilies. Above the water cormorants, terns, and gulls were flying in abundance * * *. Nothing was more attractive than the gray-headed gulls whose nests occupied scattered tufts of papyrus and rushes beyond the denser rim of papyrus along the shore, into which the water birds swam to cover in the trails made by the hippopotamuses. Most of the gulls' nests contained young, but a few eggs were found. The parents came flying to the spot as we approached in our small canvas boat, then neighboring pairs assembled and circled overhead uttering notes like those of the American laughing gull (*Larus atricilla*) * * *.

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[70] Ibis, 1915, p. 54.

This was in late July and early August.

> * * * On July 21, 1909, the writer, in company with Kermit Roosevelt, set out * * * to search for nests of this gull. Soon a nest was seen floating in the lake, having doubtlessly become detached from the vegetation in which it had been placed. On our approach a parent left this nest and began circling overhead, where it was quickly joined by its mate, and both birds were shot. A downy nestling and one egg was taken from this nest * * *. The egg measured 55 by 38 millimeters. Color, olive, streaked and blotched with dark brown, the streaks most numerous at the great end, the blotches most numerous at the small end * * *. The nestling, sex undetermined, is covered with down throughout, but the quills are sprouting, the primaries having attained a length of 20 millimeters, although still inclosed in the sheath. The neck, upper parts, sides of body, and crissum are drab gray, the feathers of the back and wings are obscurely banded with hair brown; crown and cheeks heavily spotted with fuscous; middle underparts soiled white. Irides grayish brown; bill flesh color, subterminally gray; legs and feet brownish flesh color; claws plumbeous, tipped with horn color (from fresh specimen).
>
> An older nestling (male) * * *, taken on the same day at Lake Naivasha, * * * has shed the neossoptiles from the middle portion of the crown and the sides of the face, where the permanent feathers or teleoptiles are of a gray (dark gull gray) color. On the under parts, also, many of the neossoptiles have disappeared, especially at the sides of the abdomen, disclosing the pure white final feathers. In a broad area down the middle of the abdomen, where more of the downy feathertips are retained the color is pale yellowish drab gray. The forehead, a broad stripe from the base of the bill, above the eye, extending to the back of the head, the neck, throat, and breast are pale yellowish drab gray; back dark gull gray; scapulars and wings dark gull gray tipped with pale yellowish; rump and crissum drab gray * * *.

This bird is the reference specimen used by Dwight[71] as a basis for his description of the natal down.

The nest itself is described by Mearns from another nest—

> * * * concealed in a small tuft of papyrus growing at the edge of the open water. Its situation was much like the nesting places of the red-knobbed coot (*Fulica cristata* Gmel.). This nest, as preserved, measures 210 millimeters in diameter by 100 millimeters in depth. It is made up of lumps of peaty mud, much mixed with aquatic roots, the largest lump measuring roughly 150 by 85 by 75 millimeters. Between these lumps are packed numerous petioles and rootstocks of aquatic plants, chiefly of the blue water lily. The flat top of this nest is thinly covered with roots, stems of grasses, rushes, and water lilies.

It seems as though the year old (immature) birds do not concentrate in any numbers in the breeding colonies. This is suggested by a marginal note in the Mearns manuscript:

> * * * remark on its abundance, and the scarcity of immature dark colored birds during the breeding season at Lake Naivasha.

Also, in another place in which he repeats his description of the birds circling overhead at his approach to their nests, he writes:

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[71] Bull. Amer. Mus. Nat. Hist., vol. 52, 1925, p. 272.

* * * all of the parent birds appear much excited and utter cries which closely resemble those of the laughing gull. Nearly all are adults, but with here and there a dark, immature bird.

Order COLUMBIFORMES

Family PTEROCLIDAE

PTEROCLES SENEGALENSIS SENEGALENSIS Lichtenstein

Pterocles senegalensis LICHTENSTEIN, Verz. Doubl., p. 64, 1823: Senegambia (?)

Specimens collected:

Two females, Ourso, Ethiopia, July 5–12, 1911.

One male, Dire Daoua, Ethiopia, September 14, 1911.

One male, near Bilan, Ethiopia, December 19, 1911.

Three males and two females, Wadi Malka, Ethiopia, December 22, 1911.

One male and one female, Sadi Malka, Ethiopia, January 28–30, 1912.

One male, Hawash River, Ethiopia, February 7, 1912.

The two birds from Ourso and the one from Dire Daoua were collected by M. Ouellard who disposed of them to the expedition.

The races of this sandgrouse are poorly differentiated and have been the source of much confusion and annoyance to students of African birds. The chief obstacle in the path of those who would attempt to study the geographic variations is the fact that the type locality is Senegambia, a region in which the species does not occur as far as I know. Consequently no typical material is available as a basis for subspecific work. In Lichtenstein's original description the range is given as "Senegambia, Egypt, Nubia," a matter which further complicates things as the birds of Egypt are different from those of Nubia, so that if we assume Egypt to be the true *terra typica* we have a dark typical race, while if we assume Lichtenstein's type to have come from Nubia, a lighter bird is the so-called true *senegalensis*. Sclater[72] has avoided this difficulty by "lumping" the birds of the Sudan, Chad region, Egypt, Nubia, and Ethiopia, making the composite result the typical race. This may settle the question for the moment, but when one tries to identify the more southern races, the whole matter becomes once more hopelessly tangled as the so-called "*senegalensis*" is in itself heterogeneous and thereby precludes the possibility of accurate racial demarcation. The best course to follow seems to be to exclude the darker Egyptian birds from the typical form and use the name *floweri* for them. Then the typical form becomes more homogeneous and it is possible to proceed from it as a basis. To work out the races and distribution of this bird requires much greater series than I have been able to examine and I therefore prefer to follow the arrangement in Sclater's list[72] with the exception of recognizing *floweri* as a distinct race. It is darker, more grayish on the head, back, and breast than *senegalensis*, more like the southern form *olivascens* but not as dark as the latter.

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[72] Syst. Avium Ethiop., 1924, p. 156.

If Egyptian birds are taken as typical, as suggested by Grant[73] then the birds of Ethiopia would have to be known as *ellioti* Bogdanow. However, the course outlined above seems more in keeping with the facts, both biological and historical, and is the proper one to follow.

The so-called Uganda race *emini* seems doubtfully distinct, as it is based on a single female which happened to be pale sandy in color. As may be noted below, females of the same race vary considerably.

All 12 specimens are adult. The wing lengths vary from 169 to 182 (male); 170.5 to 174 millimeters (female). The two females from Ourso are darker on the abdomen, the blackish bars broader, the reddish brown ones narrower, than in the ones from Wadi Malka and Sadi Malka. The two former are also slightly more tawny above than the latter.

Along the Hawash River Mearns found this bird to be very common, January 26 to February 13. He wrote in his field book that, "thousands drink at the Hawash morning and evening, feeding on the open plains. Shy, tough, noisy. In large flocks everywhere."

PTEROCLES SENEGALENSIS SOMALICUS (Hartert)

Pteroclurus exustus somalicus Hartert, Nov. Zool., vol. 7, p. 28, 1900: Milmil, Somaliland.

Specimens collected:

Nine male adults and five female adults, Chaffa (upper village), Ethiopia, June 24, 1912.

Three males, immature, three male adults, and seven female adults, Hor, Kenya Colony, June 27–29, 1912.

One male adult, south end Lake Rudolf, Kenya Colony, July 8, 1912.

Two female adults, 10 miles southeast Lake Rudolf, Kenya Colony, July 12, 1912.

Soft parts: Sexes alike; iris dark brown; bill entirely bluish gray; naked area surrounding eye greenish-gray; feet and claws light gray.

This subspecies is very similar to typical *senegalensis* but the upper parts are brighter and more rufescent. The differences, however, are slight and do not invariably hold, but in the great majority of cases the specimens exhibit these characters.

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[73] Ibis, 1915, p. 31.

The range of this bird is more extensive than hitherto thought. Sclater[74] writes, "Somaliland and the northern part of Kenya Colony," while more recently Van Someren[75] gives it as the, "* * * northern portion of Jubaland, and the thorn-bush country north of Mount Kenia, westward to Baringo and Lake Rudolf, and Turkhana." The present series extends the known range of *somalicus* north along the eastern shore of Lake Rudolf to southern Ethiopia (Chaffa village, near the Kenya border).

In his recent account of this species, Van Someren[75] writes that the young male in second plumage is very similar to the adult female, "* * * having much the same general appearance but differs in being more rufescent on the mantle, more barred on the breast, and a lighter brown on the belly." The three immature males from Hor, Kenya Colony, are changing from this plumage into the adult type. All three have the lower breast and abdomen similar to adult males except medially, while the rest of the plumage is immature in part or whole, indicating that the feathers of the underside of the body are the first to be molted (the remiges apparently are not shed in this molt). The molt then proceeds to the upper breast, wing coverts, interscapulars, and scapulars. At about the time the upper wing coverts are replaced, black feathers sprout in the middle of the brown abdomen. At the same time the feathers of the crown and nape are shed and, finally, the rump and upper tail coverts. All three birds still have the immature, heavily barred rectrices and lack the elongate central pair characteristic of adults. Apparently the tail is the last part to molt.

Adults in fresh plumage have the feathers of the upper back, interscapulars, scapulars, and lesser and middle upper wing coverts broadly tipped with dark brown, subterminally banded even more widely with pale tawny buff. The apical brown tips wear away and in older plumages are either very narrow or wholly wanting.

Adults vary considerably in the intensity of their coloration. Thus, three females taken at Hor on two consecutive days exhibit differences nearly as great as those between geographical forms of this species. One bird has the throat and breast deeply suffused with rufescent tawny pink and has the abdomen lighter than the other two, the dark bars being deep brown, but not by any means blackish brown; one of the others has the throat much more yellowish, the breast as in the first but lighter, and the abdomen dark brownish black barred with rufous buff; the third is intermediate between the first and the second. The second is much paler, less rufescent, above, but more heavily barred with blackish than either of the others.

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[74] Syst. Avium Ethiop., 1924, p. 156.

[75] Journ. E. Afr. and Uganda Nat. Hist. Soc., No. 29, April, 1927, p. 47.

The present series of 30 specimens ought to give a fair idea of the size variations of the race, yet the wing lengths do not agree as closely as might reasonably be expected with those given by Hartert.[76] He gives the following: Male 169–182, female 168–176 millimeters: while Mearns' series measures, male 160–178 and female 159–169 millimeters, noticeably smaller on the whole than Hartert's birds. Yet Van Someren[77] writes that Hartert's type and cotypes were, "* * * exceptionally small birds, as shown by a good series of additional material from north Somaliland"! If northern *somalicus* are usually larger than southern ones, then the two should be separated on the basis of size. I have seen no material from northern Somaliland, however, and must therefore leave the matter for some one with more material to settle. I can not help suspecting, however, that the larger, northern birds are really intermediates between *somalicus* and *senegalensis.*

This bird was recorded as follows: Boran, Lower Chaffa Village, June 23, 3 seen; Upper Chaffa Village, June 24, 1,000 noted; Chaffa, June 24–25, 200 birds; Hor, June 26–30, 1,000; Dry River south of Hor, July 1–2, 1,000; Dussia, July 3–4, 5,000 seen; Lake Rudolf, July 5–8, 1,000; Box Canyon, July 9, 25 birds; southeast of Lake Rudolf, July 10–12, 1,500 seen; Indunumara Mountains, July 13–18, 200 birds; Endoto Mountains, July 21–24, 10 seen; Er-re-re, July 25, 20 birds; Le-se-dun, July 26, 20 seen; Lekiundu River, August 4–8, 14 birds noted.

On June 24, at Upper Chaffa Village, Mearns wrote—

> * * * thousands of sand grouse watering in pools of stream. * * * Great flocks came in to water while I was hidden under a bush. They prefer to alight on rocks near pool, making a second flight or running down to the water. On alighting they immediately bowed their chests to the ground or rock, with the hinderparts tilted slightly upward. Actions like pigeons when watering. The Oena doves always joined their ranks. Movements of head like pigeons.

EREMIALECTOR GUTTURALIS SATURATIOR (Hartert)

Pterocles gutturalis saturatior HARTERT, Nov. Zool., vol. 7, 1900, p. 29: Campi-ya-Simba, Ukamba district, Kenya Colony.

Specimens collected:

Male and female, Athi Station, Uganda Railway, Kenya Colony, September 1, 1912.

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[76] Vög. pal. Fauna, p. 1511.

[77] Nov. Zool., vol. 29, 1922, p. 24.

This race of the yellow-throated sand grouse differs from typical *gutturalis* in having the edges of the upper wing coverts darker, more rufescent, less yellowish, and in having the back and rump slightly darker. This difference applies, of course, only to male birds. I have seen no females of the typical race, and can not say to what extent females of the two forms differ. However, Hartert[78] writes that the females are quite similar, that of *saturatior* being somewhat darker. The geographically intermediate form *tanganjicae* differs in the following respects from both the others. The male has the brownish color sharply restricted to the abdomen, not fading out gradually on the breast, and has the under tail coverts darker bay color, and has the throat and breast paler and grayer than *saturatior*, as does *gutturalis*. The female has the light spots on the upper parts uniformly very pale.

The material examined of the races of this species is insufficient to allow for any systematic revision, as all the specimens seen (27) belong to one form, *saturatior*. There is one point worth mentioning, however. Sclater[79] following Reichenow[80] gives the range of *tanganjicae* as southwestern Tanganyika Territory. A female from Mwanza, on the south shore of Victoria Nyanza, in the Museum of Comparative Zoölogy (A. Loveridge collection) is very similar to the description of *tanganjicae*, although a male from that locality (in the American Museum of Natural History) is like *saturatior* from Kenya Colony. Either the birds from Mwanza southwards are intermediates between *saturatior* and *tanganjicae* (which would indicate that the latter occurs farther north than known at present) or *tanganjicae* is a doubtful race.

Adult birds are by no means uniform in their coloration or size. The individual differences are marked enough to warrant calling some specimens typical *gutturalis* judging by the description of that form, while others from the same locality are certainly *saturatior*. Strangely enough, a topotypical male *saturatior* has the edges of the wing coverts lighter, more yellowish, (not darker, more reddish as in the type) and has the breast more olivaceous, the throat and cheeks yellower than any others in a series of 11 male birds from Ethiopia, Kenya Colony, and Tanganyika Territory. The difference may be due partly to age, as the latter birds look older than the one from the type locality.

The largest male examined (from Hawash River, Ethiopia) has the following measurements: Wing 220, tail 84.5, culmen 17.5; the smallest male (from Athi Station, Kenya Colony); wing 197, tail 70, culmen 17 millimeters.

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[78] Nov. Zool., vol. 7, 1900, p. 29.

[79] Syst. Avium Ethiop., 1924, p. 158.

[80] Journ. f. Ornith., 1919, p. 226.

Both birds collected were molting the remiges. The molt starts at the elbow joint and proceeds in both directions from that point. New primaries have narrow, but distinct, white apical edges and can easily be distinguished from old ones in which these edges are worn off. According to Van Someren [81] the breeding season in Kenya Colony extends over August and September, "* * * though a few birds also breed in January." It seems therefore, that the birds molt their remiges while still caring for young, rather a remarkable condition in birds that fly considerable distances daily for water. They are said to soak their breast and abdominal feathers in water and then fly back to the young birds which are entirely dependent on this source of water which they obtain by running the wet feathers through their bills. Probably the replacement of the remiges is gradual enough not to seriously impair the flight of the birds. It is noteworthy that the body feathers of the underparts, the "water carriers," so to speak, are not molted until later.

This bird has a wide distribution, from northern Ethiopia and Eritrea south to northern Tanganyika Territory, but it is rather local throughout its range and never occurs in such enormous flocks as some other sand grouse. Mearns saw as many as 200 on September 1 at Athi River, but never any masses of thousands such as are recorded for *Pterocles senegalensis*.

EREMIALECTOR LICHTENSTEINII ABESSINICUS (Geyr)

Pterocles lichtensteinii abessinicus Geyr von Schweppenburg, Orn. Monatsb., vol. 24, p. 57, 1916: Dire Daoua, Ethiopia.

Specimens collected:

Male, Bilan, Ethiopia, December 18, 1911.

Male, Sadi Malka, Ethiopia, February 2, 1912.

Two females, Iron Bridge, Hawash River, Ethiopia, February 4, 1912.

Three males, one female, Hawash River, Ethiopia, February 6–10, 1912.

Male, Sagan River, Ethiopia, June 5, 1912.

Soft parts: Male; iris, rich brown; naked skin surrounding eye, greenish yellow; toes and naked back of tarsus yellow; claws, fleshy brown. Female; iris dark brown; bare skin around eye apple green; bill all brownish black; feet yellow; claws plumbeous black.

Lichtenstein's sand grouse is a very variable species but its geographical races are hard to define because of the extent to which their limits overlap. As might be expected, the best marked form is the one most completely isolated from the others—*arabicus* of western Asia (Arabia to Baluchistan and western India), while the least distinctive one comes from a region inhabited on all sides by other races—the present form *abessinicus.* The lightest form is the Asiatic one *arabicus* in which the abdominal bars are incomplete and the general tone of the abdomen white, and the dorsal dark bars very narrow. Next to *arabicus* comes *hyperythrus* of Somaliland, Jubaland, and extreme northern Kenya Colony, which is yellowish, somewhat more rusty in color, and with the abdominal bars complete. In the western Sahara (Tuareg and Aïr highlands) is another light form, *targius* which resembles *hyperythrus* but is more rufescent and with narrower blackish bands or bars. Next in order of intensity of color comes the typical race *lichtensteinii* of the Anglo-Egyptian Sudan from Darfur to Kordofan and Sennar. This form is darker than *targius* and more broadly banded or barred. Similar to *lichtensteinii* but, on the average, considerably darker, is *abessinicus*, the form inhabiting Ethiopia, Eritrea, and northern Somaliland, while its southern neighbor in the country between Lake Rudolf, eastern Turkanaland, Turkwell, Suk, Marsabit, Karoli, and the Northern Guaso Nyiro to the country north of Mounts Elgon and Kenia, is still darker, the darkest of all the races. This is the form known as *sukensis.*

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[81] Journ. E. Africa and Uganda Nat. Hist. Soc., no. 29, April, 1927, p. 51.

While it is possible to roughly describe and characterize all these forms, it is not always possible to identify single specimens with any degree of certainty. This is particularly true of Ethiopian examples which vary more than birds from elsewhere. This is probably what led Geyr von Schweppenburg[82] to write that with larger series he thought it not unlikely that his form *abessinicus* might be further subdivided into races. It seems, however, that more material would merely indicate what the present series suggests, that is, that Ethiopian birds are nothing but intermediates between *lichtensteinii*, *hyperythrus*, and *sukensis* in varying degrees in different individuals. If the plumages of the six adult males in the present collection be carefully examined, the only conclusion possible is that every part varies individually. Thus, two birds (Hawash River and Sagon River) have wide transverse white bands on the anterior part of the crown immediately back of the black preocular band. Others (Hawash River and Bilan) have this white band interrupted medially by the black and rufescent streaked crown; still others (Hawash River) have no such white band, but merely a small white supraocular spot on either side. The width and intensity of the black bars on the back vary enormously, but not geographically. The darkest and palest birds both come from the same locality, Hawash River. Even the spotting of the throat is variable; the male from Bilan has the spotting extending right across, one from the Hawash River has it nearly continuous across the throat, while the others have the spots confined to the sides. The width of the black, abdominal bars, the intensity of the yellow on the wing-coverts, in fact, every part of the plumage, varies. The only reasons why I refrain from "lumping" *abessinicus* are, first, that I have seen no typical *lichtensteinii*, and second, that it would be difficult to decide what percentage of *abessinicus* are more like *lichtensteinii* than like *hyperythrus.* The females are as variable as the males.

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[82] Orn. Monatsb., vol. 24, p. 57, 1916.

The male from Sagon River, June 5, was molting the remiges, the three outermost ones being old, the rest new. The outermost new remex is about two-thirds grown in the right wing and somewhat more advanced in the left wing. The wing molt apparently is very gradual and probably does not impair the flight of the bird to any appreciable extent.

The males examined are larger than the females, the wing lengths being as follows: Males, 177–186.5 females, 168.5–173.5 millimeters. However, Grant[83] gives the following: Males, 175–186; females, 169–186 millimeters—figures which indicate that females attain the same maximum size as males. Similar data are presented by Hartert.[84]

In general coloration the Sagon River bird is nearer to *hyperythrus* than any of the others, a fact quite in keeping with the geographical source of the specimen. Ten birds were seen on the Sagon River, only one of which was collected.

The female collected at Iron Bridge, Hawash River, had mimosa beans in its crop. In his notes written while on the Hawash River, Mearns says that this bird, "* * * feeds on flat seeds of a thorny legume. Found at Bilan, and thence toward the entire traversed portion of the Hawash, it was quite common in mimosa scrub. It likes rocks. Utters loud note when taking flight."

EREMIALECTOR LICHTENSTEINII HYPERYTHRUS (Erlanger)

Pterocles lichtensteinii hyperythrus Erlanger, Journ. f. Ornith., 1905, p. 94, pl. 4, fig. 2: Daoua River, southern Somaliland.

Specimens collected:

Male, 18 miles southwest of Hor, Kenya Colony, July 1, 1912.

This specimen agrees with the characters of this race, but is unusual in that the entire throat is spotted with black.

It is molting the remiges; only the two outermost primaries of the old plumage are still present; the rest are new. The feathers of the abdomen are also molting to a small degree as well as those of the lower back and rump.

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[83] Ibis, 1915, p. 33.

[84] Vög. pal. Fauna, p. 1512.

Apparently the present specimen constitutes one of the northernmost records for this race in Kenya Colony. Van Someren[85] records it from Karoli, a place not far from Hor.

The single bird collected is paler than a male of *sukensis* from Guaso Nyiro. It has a wing length of 179 millimeters. It was seen together with about 30 others. At Lake Rudolf, July 5–8, four more were noted.

On June 25, at Er-re-re, a female was flushed from its nest, a slight cavity in loamy soil in a patch of scant viney weeds on a low ridge of plain bordering the Ballal River near Upper Chaffa village. There was no true nest, that is, the cavity was unlined, containing no nesting materials whatsoever. It had three eggs, equally rounded at the two ends, ground color pale olive, thickly and quite evenly blotched or marbled with olive brown (superficial) and purplish gray underlying markings. Incubation was advanced.

Another set of two eggs was found 18 miles southwest of Hor, July 2. One egg was badly cracked. Ground color of both was clay color, quite evenly spotted all over with reddish brown (superficial) and purplish gray (underlying). Largest spots 2 millimeters, smallest, mere dots. (E. A. Mearns.)

On the Guaso Nyiro River, July 31 to August 3, Mearns saw two birds, and at Lekiundu River, August 4–8, six more. Judging by the localities these two records (unfortunately only sight records) would appear to be *E. l. sukensis*.

Family COLUMBIDAE

COLUMBA ALBITORQUES Rüppell

Columba albitorques Rüppell, N. Wirbelth., Vög., p. 63, pl. 22, fig. 1, 1837: Abyssinian highlands.

Specimens collected:

Male and female, Adis Abeba, Ethiopia, December 31, 1911.
Female, Serri, Ethiopia, February 14, 1912.
Male, Arussi Plateau, 9,000 feet, Ethiopia, February 29, 1912.

Reichenbach[86] proposed a subgenus *Taenioenas* for this species on the basis of the short bill and the white band on the nape. The first character is not as distinctive as it might seem, as other species of *Columba* (such as *arquatrix* and *guinea*) have bills proportionately little larger, and the second is purely a specific color mark. I can see no reason for recognizing *Taenioenas* as a valid subgenus. In this connection it is interesting to note that Blanford[87] writes that this bird, "* * * is somewhat intermediate in its characters between

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[85] Journ. E. Afr. and Uganda Nat. Hist. Soc., No. 29, April, 1927.

[86] Naturl. Syst. Vögel, p. xxv (1853); Naturgesch. Tauben, p. 59 (1862).

[87] Geol. and Zool. Abyss., 1870, p. 416.

Columba and *Turtur*, but in its habits it is rather a pigeon than a dove, keeping in flocks, and usually on the ground."

This species is relatively scarce in collections and therefore it may be worth while tabulating the measurements of these four specimens and of two others in the Museum of Comparative Zoölogy. Reichenow [88] gives the following figures: Wing 220, tail 120–125, culmen 20, tarsus 27–28 millimeters. The present series is as follows.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Adis Abeba	♂	219	113	20. 0	28. 0
Arussi Plateau	♂	224	114	20. 0	27. 5
Debra Markos	♂	[1] 209+	117	20. 0	28. 0
Adis Abeba	♀	217	117	18. 5	27. 5
Serri	♀	219	118	20. 0	28. 0
Ethiopia	------	227	127	20. 5	30. 0

[1] Broken.

The last specimen, unfortunately without data, is much larger than any of the others, and is also more brownish and slightly paler generally. The coloration, however, may be misleading as the specimen was mounted and on exhibition for many years in the Lafresnaye collection.

The white-collared pigeon is a bird of the highlands. Blanford [87] writes that it was "* * * only seen on the highlands, in the temperate region." Heuglin [89] found it in eastern and central Ethiopia between 6,000 and 10,000 feet (1,800 to 3,000 meters), but did not meet with it west of Lake Tsana and south of Begemeder, and considered it absent in Bogosland as well. He found it common in Hamasién, Akulo-Qusai, Wogara, Semién, and on the Adoa. Later Jesse found it plentiful in northeastern Ethiopia at Ray-rayguddy (a little distance north of Senafe) and Senafe at altitudes of from 6,158 to 7,400 feet.[90] As far as I know it has not been taken at Lake Tsana, the nearest record being Debra Markos (100 miles to the south, altitude 8,000 feet) where Cheesman obtained it. Southward its range extends through Shoa to Arussi-Gallaland. Ginir seems to be the southeastern limit of its known range (Donaldson Smith collection) and Djimma the most southwestern point at which it has been taken (O. Neumann collection).

According to Neumann [91] this species occurs only on the hilltops, and does not descend into the deep river gorges even in the highlands.

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[87] Geol. and Zool. Abyss., 1870, p. 416.

[88] Vög. Afrikas, vol. 1, p. 400.

[89] Orn. N. O. Afr., vol. 1, p. 1869, p. 826.

[90] Reported by Finsch, Trans. Zool. Soc. Lond., vol. 7, 1872 (not 1870 as given by Reichenow), p. 288.

[91] Journ. f. Ornith., 1904, p. 344.

The specimen from Debra Markos (April 9, 1926, Cheesman collection) is molting the rectrices. The third (from the outside) remex in each wing is new and about two-thirds grown, the two outer ones are still to be shed; the rest are new. Inasmuch as birds usually do not undergo a complete molt (that is, one involving the wings and tail) until after the breeding season is over, it would appear that the egg-laying time in north-central Ethiopia would be about Jaunary or February, possibly a little earlier. Antinori found this pigeon breeding in Shoa in November; Erlanger[92] also found eggs in November near Adis Abeba.

COLUMBA GUINEA GUINEA Linnaeus

Columba guinea LINNAEUS, Syst. Nat., ed. 10, vol. 1, p. 163, 1758: Guinea (from Edwards).

Specimens collected:

One unsexed, Ourso, Ethiopia, no date (Cepharino collection).

One female adult, Adis Abeba, Ethiopia, December 31, 1911.

Two male adults, lake Abaya, Ethiopia, March 17, 1912.

Two male adults, Black Lake Abaya, south, Ethiopia, March 25, 1912.

Two male adults, and 1 female adult, Gato River near Gardula, Ethiopia, April 1–18, 1912.

Two male adults, and 2 female adults, near Kormali, Ethiopia, May 19, 1912.

One female, Malele, Kenya Colony, July 27, 1912.

One female adult, Lekiundu River, Kenya Colony, August 4, 1912.

Soft parts: Iris, crimson with pale yellowish ring round pupil; bill, dark lead gray, cere whitish; bare skin around the eye, red; feet, light bluish gray.

The systematics of the hackle-necked pigeon has been reviewed several times in recent years. Erlanger[93] confused the races very badly and put *longipennis* and *uhehensis* in the synonymy of *phaeonota*, where they certainly do not belong. He examined no material of *uhehensis* and ignored the fact that it is said to have a light gray rump as in *guinea*, which in itself shows it to be distinct from the dark, southern form *phaeonota*. Grant,[94] reporting on the Cozens-Lowe collections, examined the series in the British Museum and concluded that there were three recognizable forms; the typical West Africa *guinea*,, a longer winged, eastern race, *longipennis*, and a dark, southern bird, *phaeonota*. He also considered *uhehensis* nonvalid and made it a synonym of *longipennis*, a rather risky proceeding without examining any specimens, but, on the whole, more logical than that followed by Erlanger. Hartert and Goodson [95] have shown that Grant was mistaken in calling all the birds from Ethiopia to East Africa *longipennis*, for if they were identical the name *dilloni* would have to be used for them. However, the latter name really applies to the birds of Eritrea and northern Ethiopia, which are larger than other eastern birds (southern Ethiopia and East Africa). With regard to *uhehensis*, these two authors feel it wise to provisionally recognize it in the absence of material. They therefore recognize five races of this pigeon, as follows: *guinea* (West Africa to Upper Nile); *longipennis* (East Africa to southern Ethiopia); *dilloni* (northern Ethiopia, Eritrea); *uhehensis* (Uhehe district Tanganyika Territory); and *phaeonota* (South Africa). With these conclusions I differ only with regard to *longipennis*, which I consider indistinguishable from the typical form. The birds of southern Ethiopia are really intermediate between *guinea* and *dilloni*, but are closer to the former. I have seen no material of the latter or of *uhehensis* and suspect that neither are valid races, but do not feel justified in ignoring them without having seen actual specimens. Sclater and Praed [96] "* * * unhesitatingly unite *C. g. longipennis* * * *" with *C. g. guinea*. Other workers have also found that the so-called eastern form is no good.[97]

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[92] Journ. f. Ornith., 1905, p. 112.

[93] Idem, p. 113.

[94] Ibis, 1915, pp. 37–39.

The present series presents the following wing measurements: Males, 225–243 millimeters; females, 225–236.5 millimeters (one bird 215 millimeters). Hartert and Goodson [95] give 230–247 millimeters for their east African series (one bird 224 millimeters), figures which agree fairly well with mine. They give 230–240 millimeters for west African birds, and nevertheless recognize *longipennis* (although only as doubtfully separable) in spite of the similarity in measurements. I have seen no western *guinea*, but only material from the Congo-Uganda border (which Hartert and Goodson state to be typical *guinea*), but the data all point to the conclusion that it is impossible to separate eastern from western birds.

A young but fully grown female from Lekiundu River, Kenya Colony, differs from adults in being duller and paler. The neck feathers are not bifurcated; the head is drab instead of clear gray, most brownish on the crown; the triangular spots on the wing coverts are not pure white but are washed with reddish brown, those of the scapulars and the inner wing coverts being darker than those of the outer coverts; there is also a brownish tinge to the narrow edging of the wing quills; and the rump and under surface of the body are, except in texture, the same as in adults.

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[95] Nov. Zoöl., vol. 21, 1918, pp. 356–358.
[96] Ibis, 1920, p. 828.
[97] See Zedlitz, Journ. f. Ornith., 1910, pp. 340–341; Gyldenstolpe, Kungl. Sv. Vet.-Akad. Handlgr., 1924, p. 305; Van Someren, Journ. E. Afr. and Uganda Nat. Hist. Soc., No. 30, July, 1927, p. 75, etc.

Adult birds are extraordinarily variable with respect to the color of the upper tail coverts. Some individuals have these feathers practically as dark as the rectrices, while in others they are little, if any, darker than the rump. Two of the specimens (a male from Black Lake Abaya, March 25, and a female from Gato River, April 17) are both molting the rectrices, as is also a male from Ulugu, Tanganyika Territory, November 7, in the Museum of Comparative Zoölogy. The tail molt is irregular and asymetrical, the left side usually being further advanced than the right.

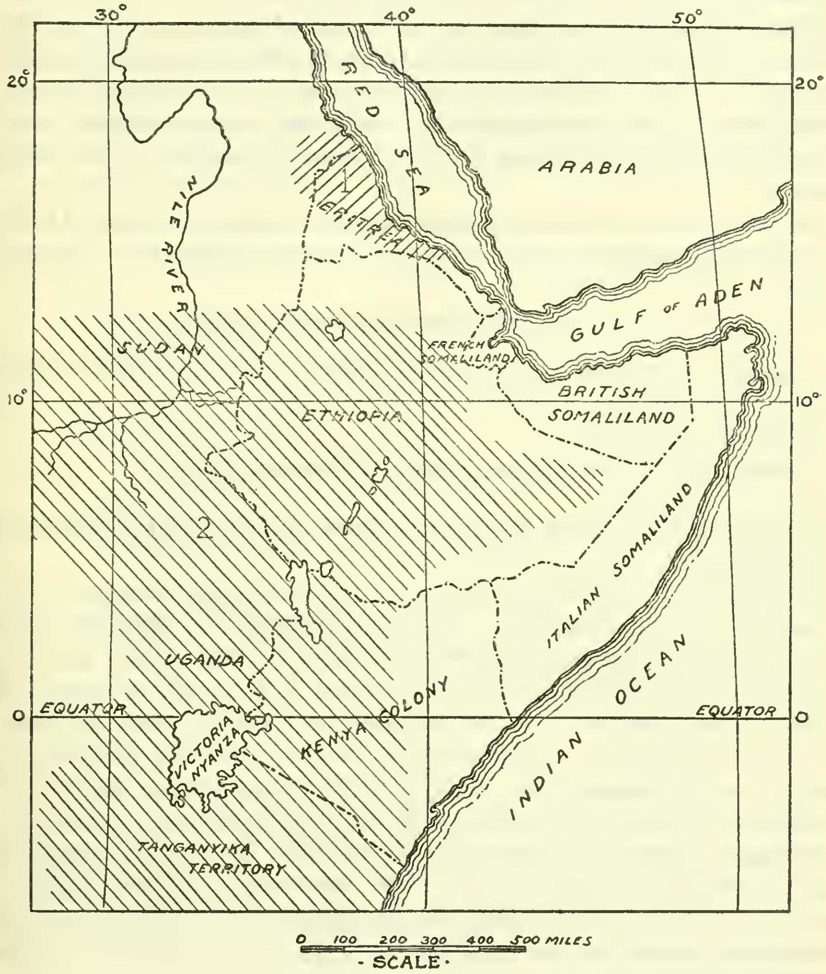

FIGURE 3.—THE DISTRIBUTION OF COLUMBA GUINEA IN NORTHEASTERN AFRICA: 1, COLUMBA GUINEA DILLONI; 2, COLUMBA GUINEA GUINEA

Sclater [98] gives the range of *guinea* as south through Kenya Colony to Kilimanjaro. This, in spite of the fact that the type locality of *longipennis* (which he synonymizes with *guinea*) is Ugogo, Tanganyika Territory. The range should be extended southward to include the Unyamyembi and Unyamwesi districts (Tabora, Ulugu, Saranda, Suna, Irangi, etc.).

This pigeon was met with in the Endoto Mountains, July 21–24, where 100 were seen; Er-re-re, July 25, 40 birds; Lekiundu River, August 4–8, over 1000 noted; Meru swamp 6 miles from Meru, August 9, 10 birds seen; Kilindini and Meru, August 10, 200 birds; and along the government trail to Tharaka, August 11, 40 birds noted.

It was also seen a few times between Bada Bourka and Adis Abeba. Great numbers were seen coming to the crater springs at Bilan to drink.

COLUMBA ARQUATRIX ARQUATRIX Temminck

Columba arquatrix TEMMINCK, Pigeons, Colombes, p. 11, pl. 5, 1809: Anteniquoi, *i. e.* Knysna, Cape Province.

Specimens collected:

Female adult, near Malka, Ethiopia, March 3, 1912.

Soft parts: Iris, dark brown; bill, bare skin around eye, feet, and claws, yellow.

Bonaparte [99] described the speckled pigeon of Ethiopia under the name *Columba arquatricula.* Eight years later Von Heuglin [1] used this name for the present bird, but other writers agreed that the Abyssinian speckled pigeon was the same as *Columba arquatrix* of South Africa and used the latter name as it had 45 years' priority. In 1905 Oberholser, in reporting on Doctor Abbott's Kilimanjaro collections [2] separated the birds of Kilimanjaro from the typical southern ones and for the former he revived Bonaparte's name. According to Oberholser, the northern birds differ from southern ones by larger size, and by smaller, much less numerous spots on the underparts, and these confined chiefly to the upper breast, while in southern examples they are spread as thickly over the lower breast and middle of the abdomen.

For the present study I have assembled a series of 22 specimens from South Africa, Tanganyika Territory, Kenya Colony, British Somaliland, and Ethiopia, and find that *arquatricula* can not be maintained as a valid race. Others have come to the same conclusion from other series of birds.[3]

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[98] Syst. Avium Ethiop., 1924, p. 161.

[99] Consp. Av., vol. 2, p. 50, 1854: Abyssinia.

[1] Journ. f. Ornith., 1862, p. 306.

[2] Proc. U. S. Nat. Mus., vol. 28, p. 841.

Neumann[4] noted that northeastern specimens (from Ethiopia) have somewhat more slender, thinner bills than birds from the Cape Province, South Africa, but that individuals from Tanganyika Territory vary in this respect, some with thicker, others with thinner bills, and that consequently the bill character could not be regarded as important. In the present series the Abyssinian birds (four specimens) all have shorter, stouter bills than the South African examples (two specimens)! The following table shows that the size variations of the southern and eastern race of this pigeon have no geographic significance.

Locality	Sex	Wing	Culmen
Ethiopia:			
Near Malka	♀	231. 0	20. 0
Arussi	♀	237. 0	19. 0
Do	♀	220+	19. 0
Do	♂	234. 0	19. 5
British Somaliland:			
Goolis Mountains		245. 0	18. 5
Do		230+	18. 0
Kenya Colony:			
Lake Ngunga	♂	235. 5	19. 0
Fort Hall	♂		19. 5
Kenya Forest	♂ (2)	232. 0	19. 0–20. 0
Do	♀ (4)	216. 0–219. 0	17. 5–20. 0
Loita Plains	♀		21. 0
Ngong Forest	♀	213. 0	19. 5
Tanganyika Territory:			
Uluguru Mountains	♂ (2)	221. 0–224. 0	20. 0–22. 0
Do	♀ (2)	222. 0–223. 0	20. 5–21. 5
South Africa		232. 0	21. 0
Do		224. 0	

In 1912[5] Madarász redescribed the Ethiopian speckled pigeon under the name *Columba sodalicia*, overlooking Bonaparte's name entirely. According to this writer the Abyssinian birds differ from specimens from East Africa in being generally darker, especially on the occiput and nape; the tarsus is said to be feathered for at least the upper half if not more, and the toes shorter (28 millimeters without claw as against 32–35 in *arquatrix*). Although no mention is made as to which toe or toes are measured, it is obvious that the long, middle one is indicated. However, none of the characters of *sodalicia* holds with any degree of constancy and the name may therefore be relegated to the synonymy of *arquatrix* without any hesitation.

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[3] See Gyldenstolpe, Kungl. Sv. Vet. Akad. Handlgr., 1924, pp. 304–305; Lönnberg, Idem, 1911, pp. 44–45; Van Someren, Journ. E. Afr. and Uganda Nat. Hist. Soc., 1927, pp. 72–75, etc.

[4] Journ. f. Ornith., 1904, p. 346.

[5] Orn. Monatsb., vol. 20, p. 46.

The juvenal plumage of this pigeon as described in detail by Lönnberg[6] agrees precisely with a specimen in the United States National Museum, except that the throat is grayish, not whitish as in Lönnberg's account. This plumage may be briefly characterized as follows: Generally dull slaty brownish; the feathers margined with rufous brown, the throat lighter, more grayish, less brownish than the breast; the occiput and nape very slightly, if any, lighter than the crown and forehead; breast and abdomen with rufous or rufous-white tips and edges. The transition from this plumage to the next is a gradual one and involves the feathers of the head and body but not the wings or tail. Lönnberg's specimen, referred to above, was probably changing into the immature plumage as it has the crown darker than the occiput and nape, and has the breast and abdomen with white apical spots as well as rufous ones. In the immature plumage the birds become grayish rather than brownish, more like the adults, the occiput and nape lose their brownish color and become bluish gray; the breast and abdomen have a slight purplish wash and dark-brown tips to the feathers.

The adult plumage is first acquired by a complete molt. Adults vary greatly in coloration, particularly in the purplish or reddish or bluish wash of the back and under parts and the darkness or lightness of the nape. This was noted as long ago as 1905 when Erlanger[7] ascribed the differences solely to individual variation. Granvik[8] corroborates this and writes that within a single month in one district he has, " * * * shot birds with a dark, brown-violet under surface, others with a light greyish red belly, etc. Some have the crown and neck bright light gray (the commonest state), others have these parts dark grayish blue (almost the same color as the young bird)." This is also well shown by the present series. It is rather interesting that the color of the occiput and nape should vary in *arquatrix* for the western races *albinucha*, *sjostedti*, and *thomensis*, are based largely on the color of these parts, which, in them, seems quite constant. I have no doubt that Madarász was led to describe the Ethiopian bird as distinct because he compared a dark-naped individual from that country with a light-naped one from East Africa.

Van Someren[9] writes that his Kenya Colony birds have a distinct greenish sheen on the inner secondaries and coverts, which are dull brownish in South African examples. This is certainly not upheld by the series of birds available for study.

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[6] Arkiv för Zoologi, vol. 9, No. 14, 1915, p. 3.

[7] Journ. f. Ornith., 1905, p. 115.

[8] Idem, Sonderheft, 1923, p. 48.

[9] Nov. Zool., vol. 29, p. 34.

Females average more finely spotted than males.

The speckled pigeon is entirely a bird of the forests and, consequently, its distribution is as discontinuous and spotty as is that of forest areas. In Ethiopia and northern Kenya Colony, true forest is found chiefly on the mountains, and consequently the present bird is a highland form, although in South Africa it occurs in the lowland forests. Because of its dependence on a rather restricted and local type of habitat, it has been overlooked by several collectors, such as Jesse, whose birds were reported on by Finsch,[10] Blanford,[11] Donaldson Smith,[12] Zedlitz,[13] and others. Neumann[14] found it in the highlands at elevations of from 2,000 to 3,000 meters (6,600–10,000 feet); Erlanger[15] noted it at over 3,000 meters at Garra Mulata near Harrar, and also at somewhat lower elevations in the forests of the Djam-djam country around the southern Shoan Lake region.

Besides the specimen collected, Mearns observed flocks of this species around the Abaya Lakes, March 13–18, the largest number recorded in one day being 500 birds. He also noted it at Aletta, March 7–13, 50 seen; and Gato River, March 29 to May 17, 100 birds.

The name *arquatrix* is often credited to Temminck and Knip, but Doctor Richmond informs me that all that Madam Knip had to do with the work in which this name first appeared was to draw the illustrations. Temminck alone was responsible for the text.

STREPTOPELIA LUGENS (Rüppell)

Columba lugens Rüppell, Neue Wirbelth., Vög., p. 64, pl. 22, fig. 2, 1837: Abyssinian highlands (Taranta Mountains, Tigre).

Specimens collected:

One male and three females, Adis Abeba, Ethiopia, January 2–10, 1912.

One male, Alaltu, Ethiopia, January 16, 1912.

One male and two females, Arussi Plateau, Ethiopia, February 21–22, 1912.

One male, Malke, Ethiopia, March 3, 1912.

One male, near Gato River, Ethiopia, April 17, 1912.

One female, Sagon River, Ethiopia, June 4, 1912.

One female, Tertale, Ethiopia, June 9, 1912.

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[10] Trans. Zool. Soc. Lond., 1872.

[11] Geol. and Zool. Abyss., 1870.

[12] See Sharpe, Proc. Zool. Soc. Lond., 1895.

[13] Journ. f. Ornith., 1910.

[14] Idem, 1904, p. 346.

[15] Idem, 1905, p. 114.

Soft parts: Iris, pale pinkish orange; region around eye and the feet, vinaceous red; bill, plumbeous black; claws, olive brown.

This dove is entirely restricted to eastern Africa from Ethiopia to northern Nyasaland, although a closely related bird, possibly only subspecifically distinct, is known from the highlands of northern Cameroon and northern Nigeria (*S. hypopyrrhus* Reichenow).

Van Someren[16] separated the birds of Kenya Colony from the typical Ethiopian ones on the basis of smaller size and darker color. To the southern form he gave the name *funebrea* (Mount Elgon-type locality). According to his description *funebrea* has a wing length of from 175–180 millimeters as against 185–192 millimeters in typical *lugens*. Also *funebrea* is said to have the pinkish-buff breast band darker and narrower, the gray of the breast and abdomen much darker, and the buff on the throat less extensive than in *lugens*. Gyldenstolpe[17] writes that of the several characters pointed out by Van Someren, only one is confirmed by his series of nine birds from the Uganda-Congo border region. He had but a single Ethiopian specimen, however, and therefore recognizes *funebrea* rather than synonymize it on such slender material. He writes that his Congo birds only confirm—

> * * * that the gray color of the head and nape is darker than the same parts in the Abyssinian bird. It is only on account of this difference that I have accepted *S. l. funebra* as a distinct subspecies * * * when a large material of Abyssinian birds becomes available for examination, it seems * * * that Van Someren's * * * *funebra* must be placed as a synonym to *S. l. lugens* * * *.

The material assembled for the present study consists of 14 birds from Ethiopia and 8 from Kenya Colony, and corroborates Gyldenstolpe's observations. Not one of the characters of *funebrea* (not *funebra* as spelled by Gyldenstolpe) holds good. Ethiopian birds are not larger as a rule, although it is true that the largest Ethiopian examples are larger than the biggest ones from Kenya Colony. Of the 14 Ethiopian birds only 2 have wings more than 185 millimeters in length, and 8 have them under 180 millimeters. They range from 170–188 millimeters, while the 8 birds from Kenya Colony range from 176–178.5 millimeters. In color there are no constant differences, not even the one noted by Gyldenstolpe, a fact which suggests that the western birds (Ruanda and eastern Congo) may be separable from eastern ones on the basis of darker head and nape color.

Van Someren[18] writes that in south Ethiopia is found an intermediate race which is not as pale as typical *lugens* but not as dark as *funebrea.* In size it agrees with the latter. The range seems to be southern Ethiopia to Turkana and northern shores of Lake Rudolf. It must be admitted that Mearns' series may all refer to this intermediate, but it is certainly impossible to draw a line between them and birds from farther south, and inasmuch as the size variation is so great among these specimens it seems doubtful that a line can be drawn between them and north Abyssinian material.

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[16] Bull. Brit. Orn. Cl., vol. 40, p. 21, 1919.

[17] Kung. Sv. Vet. Akad. Handlgr., 1924, pp. 307–308.

[18] Nov. Zool., vol. 29, 1922, p. 38.

Streptopelia lugens ranges from northern Ethiopia (Tigre district) south through Shoa and Somaliland, Kenya Colony, Uganda, the eastern Belgian Congo, and Tanganyika Territory to Nyasaland. It breeds in forested areas chiefly (if not wholly) and therefore has a rather discontinuous distribution, but when not breeding, the birds gather in more open country, Acacia savannas, and even in cultivated areas, so that a study restricted to museum specimens taken at all times of the year would suggest that the species was more widely distributed than its breeding range would indicate. Inasmuch as forest areas are more or less restricted to mountainous districts in eastern Africa, it follows that this pigeon is chiefly a bird of the highlands. The three specimens from the Arussi Plateau were taken in juniper woods at an altitude of 9,000 feet (2,700 meters).

The series examined illustrates the plumage changes of this species very well. A nestling bird in postnatal molt (taken at Nairobi, June 22) shows that the natal down is light straw yellow. The juvenal plumage is dark earth brown above, each feather with rufous edges and tip; the underparts more slate gray but still quite brownish, the feathers apically narrowly margined with light rufous, the feathers of the throat somewhat lighter than elsewhere.

An incomplete postjuvenal molt ushers in the immature plumage which is similar to that of the adult but lacks the black crescent on the sides of the neck and has the head more ashy, the back darker brown, and the feathers of the body, both dorsal and ventral, duller and narrowly edged with pale rufous tawny, the wing coverts widely edged with rufous. One of the females from the Arussi Plateau (February 22) is in an advanced stage of the postimmature molt. Apparently this molt begins with the feathers of the abdomen and lower back, then spreads to the tail and then to the wings.

Adult females average somewhat paler on the underparts than males.

This pigeon was noted on the following occasions: Aletta, March 7–13, 100 birds; Gato River, March 29 to May 17, 30; Sagon River and Bodessa, June 3–6, 1 seen; Tertale, June 7–12, 550 birds; El

Ade, June 12–14, 150 noted; Mar Mora, June 14, 20; Turturo, June 15–17, 8 birds seen; Meru swamp, equator, August 9, 20; Kilindini by way of Meru, August 10, 50; on the government trail to Tharaka, August 11, 10 birds.

In Ethiopia the breeding season is from January to the end of May, according to Erlanger.[19]

STREPTOPELIA SEMITORQUATA SEMITORQUATA (Rüppell)

Columba semitorquata Rüppell, Neue Wirbelth., Vög., p. 66, pl. 23, fig. 2, 1837: Taranta Mountains, Ethiopia.

Specimens collected:

Two females, Gada Bourca, Ethiopia, December 25, 1911.

Two males and one female, Hawash River, Ethiopia, February 10–11, 1912.

One female, Loco, Ethiopia, March 14, 1912.

One male and two females, Gato River near Gardula, Ethiopia, April 6–17, 1912.

One male and one female, Sagon River, Ethiopia, June 5, 1912 (mated pair).

One female, Bodessa, Ethiopia, June 6, 1912.

One male, Tana River, Kenya Colony, August 15, 1912.

One male and one female, Escarpment, 7,390 feet, Kenya Colony, September 9, 1912.

Soft parts (sexes alike): Iris, orange red; bill, plumbeous black; naked area surrounding eye, gray mixed with vinaceous; feet, vinaceous; claws, vinaceous at base, grayish brown at end.

This dove has two recognizable forms—the typical race which occurs in eastern Africa from the Sudan and northern Ethiopia (also Yemen province of Arabia) south through the interior of Kenya Colony, Uganda, the eastern Belgian Congo, Tanganyika Territory, Mozambique, and Nyasaland to South Africa (particularly Natal, Zululand, Basutoland, and the eastern Transvaal, but also occurring farther west), and also in West Africa from Senegal to Angola; and a small, pale form *minor* in the coastal areas of Kenya Colony and in southern Somaliland. Three other forms have been described, none of which is valid. Erlanger[20] separated the birds of southern Ethiopia (Harrar and Shoa) and tropical East Africa from the northern typical ones as *intermedia* on the basis of somewhat darker brown color on the upper parts and smaller size (wings 177–190 millimeters, while in *semitorquata* 187–198 millimeters). As may be seen from the measurements given below the size difference does not hold. The color likewise is variable without regard to geography.

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[19] Journ. f. Ornith., 1905, pp. 119–120.

[20] Idem, p. 124.

Swainson[21] described the West African birds as *Turtur erythrophrys* at about the same time as Rüppell described *semitorquata* from Ethiopia, but the latter's work was published first and his name therefore stands. However, *erythrophrys* has been usually considered a valid race, based on more rufescent color of the underparts. This character is extremely variable, both extremes being found in all parts of the range of the species, and can not therefore be used as a subspecific criterion. Some idea of the similarity between *erythrophrys* and *semitorquata* may be gained from the fact that Gyldenstolpe[22] considers South African birds the same as West African, although other workers consider them the same as East African examples. Gyldenstolpe, however, writes that, "* * * there are no differences whatever—at least no constant ones—between birds from West Africa and those from eastern Belgian Congo, Uganda, Central Kenya Colony, and Tanganyika Territory," and unites them with *intermedia*, using Swainson's name on account of priority. However. inasmuch as *intermedia* is not distinct from *semitorquata* it follows that *erythrophrys* is likewise not recognizable.

The third proposed race is Granvik's form *elgonensis*[23] from Mount Elgon, said to differ from *semitorquata* in having the crown, belly, lower rump, and under tail coverts dark gray; the neck, throat, and breast dark wine color, tinged with rusty, and with a pale, sometimes scarcely discernible, shade of gray on only a few of the wing coverts. Although he comments on the great variation in *semitorquata* he bases this form on a single skin and another which was shot but not preserved. The important thing from our standpoint however, is his note that in the Berlin Museum he found a specimen from Bukoba which has the belly, lower rump, and under tail coverts dark gray, "* * * but the neck * * * wine colored * * *." In the Museum of Comparative Zoölogy is a male from Chantwara, Bukoba, that has the crown as in Granvik's type specimen of *elgonensis* but is otherwise like *semitorquata*. Apparently then, two birds from Bukoba exhibit some of the characters of *elgonensis*, but different ones in each case—an indication at least, that *elgonensis* is probably based on some such individual variant. More material from Mount Elgon is needed before this form can be allowed recognition.

In studying the systematics of this bird, I have assembled a series of 63 specimens. The wing length of adults are as follows: Ethiopia; males: 179.5, 185, 185.5, 187, 187, 188, 190, 191.5, 192.5, 194; females: 175.5, 179, 179.5, 179.5, 179.5, 180, 181.5, 184, 184, 186, 186.5 195.5. Kenya Colony, males: 180, 181, 185.5, 186, 191; females: 168,

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[21] Bds. West Afr., vol. 2, p. 207, pl. 22, 1837.

[22] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 310.

[23] Journ. f. Ornith., 1923, Sonderheft, p. 51.

170, 172, 173.5, 174, 175, 177, 177, 181. Uganda, males: 177.5; female (immature) 167. Eastern Belgian Congo, males: 180, 181. Tanganyika Territory, males: 176, 178, 183, 183.5, 186.5; females: 168 (immature) 179, 186. South Africa, male: (immature) 167, unsexed 192.5. Cameroon, males: 167, 172.5; females: 169, 177, Liberia, males: 179.5, 181. It will be noticed that Ethiopian birds average larger than birds from Kenya Colony. It is also true that the two maxima for the latter country (male 191 millimeters, female 181 millimeters) both come from a high altitude (Escarpment, 7,390 feet) while the others come from lower altitudes (under 5,500 feet). Granvik's type (male) of *elgonensis* (from an altitude of 7,000 feet) has a wing length of 190 millimeters thereby agreeing with the Escarpment male. The eastern Congo is a highland region and the birds from it, recorded above, and those listed by Gyldenstolpe[22] are fairly large. Likewise in Tanganyika Territory the largest specimens listed come from the Uluguru Mountains. It seems possible, therefore, that there may be a larger highland race and a smaller lowland form, but at present it is impossible to tell where one ends and the other begins. If two such forms be eventually satisfactorily defined, then the large form would be typical *semitorquata* and the smaller one would have to be called by Swainson's name *erythrophrys.* I agree with Zedlitz that *minor* is a valid form, but would extend the range as given by him to include the coastal strip of Kenya south of the Tanganyika border. The range of *semitorquata* would have to be altered to cover the highlands of East, South, and Central Africa.

The long series of birds studied illustrate the sequence of plumages and molts, and as some stages seem to be undescribed, the following summary may prove useful.

The juvenal plumage is dark, dull earth brown on the top of the head and the upper parts generally, including the wings, each feather broadly tipped with bright rufous tawny, the tips being especially broad on the head and nape; underparts paler brown, more sandy in tone, and with pale tawny tips to the feathers.

The postjuvenal molt seems to be a complete one, but more material is needed to make certain of this point. The immature plumage resembles that of the adult but has the black nuchal crescent poorly developed and has the remiges tipped with tawny cinnamon. This plumage is replaced by a complete molt and is succeeded by the adult plumage.

Adults vary enormously, and for this reason long series are absolutely essential to the study of geographic forms. Occasionally one finds local outbreaks of erythrism or of paleness, but such cases, while interesting and perplexing, are not to be taken for valid races. Thus, five adults from the Arussi district are noticeably redder on the underparts, particularly the breast, than four from Maracó, near Lake Zwai, Ethiopia. However, a sixth bird from Arussi agrees perfectly with those from Maracó.

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[22] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 310.

The female from Bodessa (June 6) and the male from Tana River (August 15) were molting the remiges, a fair indication that they were through breeding. On the other hand, the male and female taken on June 5 at Sagon River were apparently a mated pair.

Besides the actual specimens recorded, Mearns noted this pigeon as follows: Boran, Lower Chaffa Village, June 23, 10 birds: Endoto Mountains, July 21–24, 20; south of Malele, July 28–29, 6 seen; Kilindini and Meru, August 10, 50; on the government trail to Tharaka, August 11, 100; from the Tharaka district to the Tana, Thika, and Athi Rivers, and along the Uganda railway to Escarpment, August 12 to September 4, anywhere from 20 to 200 of these birds were seen every day.

Erlanger[24] found the birds breeding in April and May near Harrar; in January and February in the Ginir district of Arussi-Gallaland.

STREPTOPELIA DECIPIENS (Finsch and Hartlaub)

This species is represented in the present collection by six specimens belonging to three races which are treated separately below. However, the variations and geographic forms of this dove are so puzzling that I have assembled a series of 53 birds, including all of the named subspecies, and have carefully reviewed their taxonomy. Three important reviews of this difficult group have already appeared, the first being that by Erlanger,[24] the other two by Zedlitz.[25] The latter two correct many of the errors made in the first revision, and were it not for the fact that Erlanger's work has confused the synonymy of the Ethiopian birds we might pass it by without notice. He recorded birds from the Abaya Lakes district, Gandjule, and Sagon Valley as *ambigua*, a race which occurs, as far as known, only in Angola, the Katanga, and Northern Rhodesia. However, it must be remembered that at the time he worked, the name *ambigua* was used for the birds now known as *permista* as well as true *ambigua*. *S. d. permista* was not separated until later on in the same year.[26]

In his first revision Zedlitz considered *shelleyi* as a western race of *decipiens* while Erlanger had dealt with it as a form of *semitorquatus*, which it clearly is not. Erlanger had recognized only three races—*decipiens*, *ambigua*, and *griseiventris*, while Zedlitz increased the number to six. In his later work he added a seventh, and it is this work that has been adopted without change by Sclater in the Systema Avium Ethiopicarum (p. 166). With his results my studies agree fairly well, but some of his accounts of geographic ranges need modification. As far as the material examined indicates, the ranges of the eastern races of this dove are as shown on the accompanying map. Of all the forms seen, the western ones have been least well represented and consequently least accurately worked out. In the absence of material from Nigeria and Cameroon, I can do nothing but follow Sclater [27] in regarding *logonensis* as probably a synonym of *shelleyi*. Likewise, *kafuensis* seems to be the same as *ambigua*. On the other hand it appears probable that larger series will show that *permista* is really composed of two forms, a lighter, southern, and a duskier, northern one. This has also been suggested by Zedlitz, but in the present case, as in his, lack of sufficient material makes it unwise to split the group.

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[24] Journ. f. Ornith., 1905, p. 125.

[25] Idem, 1910, pp. 346–350, and 1914, pp. 645–649.

[26] Reichenow, Vögel Afr., vol. 3, 1905, p. 803.

The races of this dove inhabiting eastern Africa are as follows:

1. *S. d. decipiens.*—Northern half of the Anglo-Egyptian Sudan from the Lake Chad district east through Darfur and Kordofan to the Nile as far south as Lake No, northeast to Sennar, Suakin, and, in the northern part of its range east to the Red Sea (Port Sudan). Sclater [27] does not record it east of Sennar and Suakin, but recently Chapin has obtained it at Port Sudan (specimen No. 262049 Am. Mus. Nat. Hist.).

2. *S. d. shelleyi.*—Assuming that *logonensis* is the same as *shelleyi* this western, darkly colored form, occurs in the region under discussion, in the extreme eastern edge of the Belgian Congo and adjacent portions of western Uganda. This form occurs on the western, southern, and northern shores of Lake Albert, and intergrades in the West Nile Province of Uganda with both *permista* and *decipiens*. The resulting birds are very difficult to determine satisfactorily and consequently it is not surprising to find various names applied to them. Sclater and Praed [28] list specimens from the Bahr el Zeraf district of the Sudan as near *permista*, while Gyldenstolpe [29] considers a bird from near Mongalla as *griseiventris*. He makes the mistake, however, of considering birds from Kisumu (with which he compared the Mongalla specimen) as typical *permista* which they are not. Kisumu birds are intergrades between *permista* and *perspicillata*.

3. *S. d. permista.*—This race occurs east of the Congo watershed and west of the Rift Valley from the Nyasaland region north through western Tanganyika Territory (east to the Wembere Steppes, the Ugogo and Unyamwezi districts and the Mwanza area)

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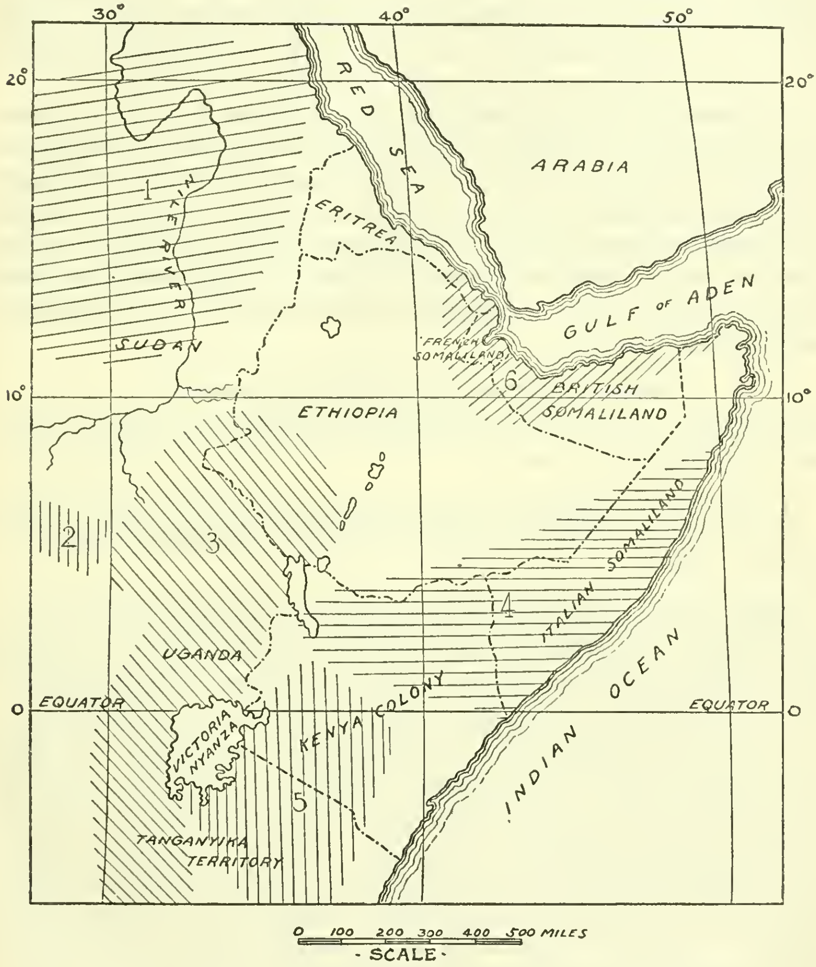
[27] Syst. Avium Ethiop., 1924, p. 166.

[28] Ibis, 1920, p. 830.

[29] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 310.

and Uganda to the Nile system, thence north through the Elgon district, west of Turkanaland, into the Abaya Lakes district of Ethiopia and into northwestern Uganda and the southern Sudan (the old "Lado Enclave"), there intergrading with *decipiens* on the north.



Figuge 4.—The distribution of Streptopelia decipiens in northeastern Africa: 1, Streptopelia decipiens decipiens; 2, Streptopelia decipiens shelleyi; 3, Streptopelia decipiens permista; 4, Streptopelia decipiens elegans; 5, Streptopelia decipiens perspicillata; 6, Streptopelia decipiens griseiventris

4. *S. d. perspicillata.*—Tanganyika Territory and Kenya Colony, east of the Rift Valley, west of the coastal plain from central Tanganyika Territory (Dodoma district) north through the Ukamba, Masai, and Kikuyu districts of Kenya Colony to Turkanaland. In the region south of Lake Rudolf it seems to intergrade

with *elegans* to some extent, but the birds of Barsaloi are of the latter race.

5. *S. d. elegans.*—Southern Somaliland, Jubaland, and extreme northern Kenya Colony southwest to Barsaloi (three specimens Am. Mus. Nat. Hist.).

6. *S. d. griseiventris.*—Northern Somaliland, southern Eritrea, and the Hawash region of Ethiopia to the Arussi country. This race is not too well differentiated from the typical form and individuals occur that may be placed with either form equally well.

The other named form, *ambigua*, does not occur in eastern Africa, but is restricted to Angola, the Katanga, and western portions of Northern Rhodesia. The so-called *kafuensis* which is generally considered the same as *ambigua* (and which I have not seen) is said to be darker than the latter. This suggests that the birds on which this Rhodesian form was based are merely intermediates between *ambigua* and *permista*, a suggestion which conforms very well with geography in this case.

STREPTOPELIA DECIPIENS PERMISTA (Reichenow)

Turtur ambiguus permistus Reichenow, Vög. Afr., vol. 3, 1905, p. 808: Maliwungu, Tanganyika Territory.

Specimens collected:

Three females, Gato River, near Gardula, Ethiopia, March 31 to April 14, 1912.

These three specimens are somewhat intermediate between *permista* and *griseiventris*, but are nearer the former. They are noticeably darker below and above than two specimens from northern and northwestern Tanganyika Territory (Mwanza and Bukoba).

The wing measurements given by Zedlitz[30] are larger than those of the present series. His figures are 160–165 millimeters, while my measurements are 156.5–158 for the Ethiopian examples and 159.5 for those from Tanganyika Territory. However, all mine are based on females, and his were probably based, at least partly, on males, although no indication of sex is given. However, the measurements given by Granvik[31] agree with mine, and it is noteworthy that his birds are males; wings, 155–157 millimeters.

The exact geographical location of the type locality Maliwungu, is a matter that should be made clear. I have not found it on any map, and Reichenow, in the atlas of his great work, merely suggests "Rovuma River(?)," which is, of course, the border line between Tanganyika Territory and Mozambique.

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[30] Journ. f. Ornith., 1914, p. 648.

[31] Idem, 1923, Sonderheft, p. 52.

The immature plumage, which appears to be undescribed, is as follows: Head and underparts dull sandy ochraceous gray, palest on the throat and abdomen which are very light, the forehead somewhat paler than the rest of the top of the head; all the feathers terminally edged with buffy white, giving a faint barred effect to the bird; upper parts deep olivaceous ashy brown, each feather tipped narrowly with pale buff, the tips on the remiges somewhat broader and wider.

A complete postjuvenal molt brings on the adult plumage. The molt begins on the throat, chin, and abdomen, then spreads to the under tail coverts, the middle and greater upper wing coverts then to the innermost primaries and outermost secondaries; then to the crown, nape, lower back, rump, and outer tail feathers. The rectrices molt centripitally. The last parts to change are the breast and interscapulars. The immature male from Gato River is in an advanced stage of the postjuvenal molt.

STREPTOPELIA DECIPIENS GRISEIVENTRIS (Erlanger)

Turtur decipiens griseiventris ERLANGER, Journ. f. Ornith., vol. 53, p. 126, pl. 6, fig. 26, 1905: Artu, north Somaliland.

Specimens collected:
Male, Dire Daoua, Ethiopia, December 5, 1911.
Female, Sadi Malka, Ethiopia, January 28, 1912.

These specimens are confusing in that neither is typical *griseiventris.* The male from Dire Daoua is intermediate between this form and *elegans* and is very light on the belly and under tail coverts, while the female from Sadi Malka is nearest to *griseiventris* but approaches *decipiens.* Neither agrees with Erlanger's description and figure of *griseiventris* as well as others from places more remote from the type locality, such as Maracó, Lake Zwai, and the Arussi country. This form seems to be the least well founded, its characters the least stable and constant, of any of the seven subspecies. (In the course of this study six specimens of *griseiventris* have been examined.) It is supposed to be more violaceous on the nape and underparts than *decipiens.*

The color of the nape and occiput varies as in *perspicillata.* The bird from Sadi Malka has these parts much suffused with vinaceous pink, while in that from Dire Daoua, the pinkish is confined to the nape. The wing measurements of the series of this race vary from 166–170 (male) and 160–172.5 millimeters (female).

STREPTOPELIA DECIPIENS PERSPICILLATA (Fischer and Reichenow)

Turtur perspicillata Fischer and Reichenow, Journ. f. Ornith., vol. 32, p. 179, 1884: Nguruman, Masailand.

Specimens collected:

Female, Reishat, Lake Rudolf, Kenya Colony, May 25, 1912.

This specimen agrees perfectly with six from the Dodoma, Kilosa district of Tanganyika Territory. This race and *elegans* are the two lightest of all the forms and are, on that account, easily recognized. The present form is larger and very slightly darker than *elegans* but otherwise very similar.

Considerable variation occurs in the coloration of the crown and nape. Some of the Tanganyikan birds have the entire crown and nape gray like the forehead, others have it suffused with pinkish as does the present individual. Two birds from Kisumu, Kavirondo Gulf, are very different however, but can not be considered anything but intergrades between *perspicillata* and *permista*. They are generally darker like the latter, more vinaceous on the throat and breast, and have the nape, occiput and hind part of the crown up to the middle of the eyes deep vinaceous pink, markedly different from the gray of the forehead. In size they agree with *perspicillata*.

The under tail coverts are also variable, the Kisumu birds having them quite dark grayish, while the Rudolf and Tanganyika specimens have the gray reduced in extent and lighter, the feathers being chiefly composed of the broad white edges.

Berlioz [32] records a specimen of *perspicillata* from Turkanaland which agrees in every respect with the one listed above except in size. It has a bill 2 millimeters smaller. His bird, a male, has a wing length of 156 millimeters, while Mearns' specimen measures 168.5 millimeters. These two records constitute the northernmost captures of the race. Judging by the small size of the bird Berlioz lists, it seems as though it may be intermediate between *permista* and the present form. His bird came from west of Lake Rudolf while Mearns' is the first, and as far as I know, the only one taken east of the lake, a region in which *elegans* is the dominant race.

STREPTOPELIA CAPICOLA SOMALICA (Erlanger)

Turtur damarensis somalicus Erlanger, Journ. f. Ornith., vol. 53, p. 127, 1905: Sarigo, southern Somaliland.

Specimens collected:

One male, East Lake Stefanie, Ethiopia, May 30, 1912.

One female, Mar Mora, Ethiopia, June 14, 1912.

One male and two females, 18 miles southwest of Hor, Kenya Colony, July 1–2, 1912.

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[32] Bull. Mus. d'Hist. Nat. Paris, vol. 28, 1922, p. 394.

One male and one female, Indunumara Mountains, Kenya Colony, July 15, 1912.

The birds from Ethiopia (Mar Mora and east of Lake Stefanie) are the first records for this race in that country and constitute the northwestern limits of the known range of *somalica*. They are not entirely typical but are nearer to this form than any other. They are slightly larger and darker than those from northern Kenya Colony, suggesting in these respects the larger, darker, more northern form *electa*. The following measurements show this quite clearly.

Males: Ethiopia (Lake Stefanie), wing 153, tail 108, culmen 16 millimeters. Kenya Colony, wing 146–145, tail 100–107, culmen 15–16 millimeters.

Females: Ethiopia (Mar Mora), wing 146, tail 103, culmen 14.5 millimeters. Kenya Colony, wing 140–145, tail 98.5–108, culmen 14.5–15 millimeters.

This race is the smallest of all the forms of *S. capicola*, and, with the exception of *hilgerti*, is also the palest and lightest. In the southern part of its range (Kilimanjaro south along the Tanganyikan coast to the Pangani River) the birds are slightly duskier than those of Jubaland and southern Somaliland, approaching *anceps* in general appearance.

The male and one of the females taken 18 miles southwest of Hor were apparently a mated pair.

These birds were seen in large numbers every day on the journey from the Lower Chaffa Village to the Athi River station on the Uganda Railway (August 12 to September 1). The numbers observed varied from 20 to 1,000 birds a day.

STREPTOPELIA CAPICOLA ELECTA (Madarász)

Turtur electus Madarász, Orn. Monatsb., 1913, p. 7: Maraquó, Ethiopia.

Specimens collected:

One male and two females, Dire Daoua, Ethiopia, December 15–22, 1911.

Male and female, Bodessa, Ethiopia, May 22, 1912.

Soft parts (alike in both sexes): Iris, dark brown; bill, black; bare skin around eye, lead color; feet, vinaceous; claws, blackish.

In identifying the specimens of this race and of the next form, a large series of specimens (72) from all parts of Africa has been studied and the conclusions reached by Zedlitz[33] have been found to hold; the only point to be added to his revision is the inclusion of the recently described Tanganyikan form *anceps* Friedmann.[34]

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[33] Journ. f. Ornith., 1914, p. 649.

[34] Proc. N. Eng. Zool. Cl., vol. 10, p. 67, Aug. 20, 1928.

The races found in eastern Africa are as follows:

1. *S. c. capicola.*—South Africa east to Natal and Zululand, north to Transvaal.
2. *S. c. tropica.*—From the northern Transvaal, and Mozambique north through eastern Tanganyika Territory (west of the Rift Valley except in the southern part of the territory where it extends far to the eastward) to Uganda, east to Mount Elgon and north to Mount Kenia and the highlands of the interior of southern Kenya Colony (about 5,000 feet, or 1,500 meters).
3. *S. c. anceps.*—From Kilosa and Dodoma, central Tanganyika Territory, east of the Rift Valley, west of the coastal areas north to southern Kenya Colony (below 5,000 feet) but not in the low coastal belt.
4. *S. c. somalica.*—Coastal districts of East Africa from the Pangani River north to southern Somaliland, Jubaland, inland in Kenya Colony to the Taru Desert, the Indunumara Mountains, north to Hor and extreme southern Ethiopia (east of Lake Stefanie, and at Mar Mora).
5. *S. c. electa.*—Ethiopia, from northeastern Gallaland through the Arussi country to the Shoan Lake region.
6. *S. c. hilgerti.*—None seen by me; said to occur in northern Somaliland.

Recently Grote[35] has described a pigeon from the eastern Belgian Congo (Kisenyi, Lake Kivu) which he considers as a race of *Streptopelia vinacea*, and which he calls *dryas.* The known distribution of *S. vinacea* makes it seem very unlikely that the species occurs as far south as Lake Kivu and the description of *dryas* as well as its geographical location indicates that it is really a form of *S. capicola*—a richly colored form, if separable from *tropica* by its deeper coloration—but not a race of *S. vinacea.* I have seen no material from the Kivu region and therefore can not form an opinion as to the validity of *dryas.* However, in support of this form, it should be noted that Gyldenstolpe[36] collected two males of *S. capicola* in the eastern Congo, one at Sidabo, Ituri district, west of Lake Albert, and another at Masidongo, west of Ruwenzori, northwest of Lake Edward. The latter place is about 220 kilometers north of the type locality of *dryas*, but Gyldenstolpe writes that the Masidongo specimen is exceptionally bright colored on the lower parts of the body, especially on the breast. It may therefore belong to the new form named by Grote, and if so, would extend the range of *dryas* over a considerable area. The bird from Sidabo is not said by its collector to be richly colored and may therefore be assumed to be like typical *tropica.*

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[35] Verh. Orn. Ges. Bayern, vol. 17, 1927, p. 205.

[36] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 311.

The name *dryas*, signifying a forest habitat, is poorly chosen as neither *capicola* nor *vinacea* is ever seen within the area of true forest.

It is rather unfortunate that the name *electa* is wrongly spelled in Sclater's list, where it appears as *eclecta*, inasmuch as this work will be widely used by students of African birds. In other papers (such as Van Someren,[37] it is spelled *electra*, which is likewise incorrect.

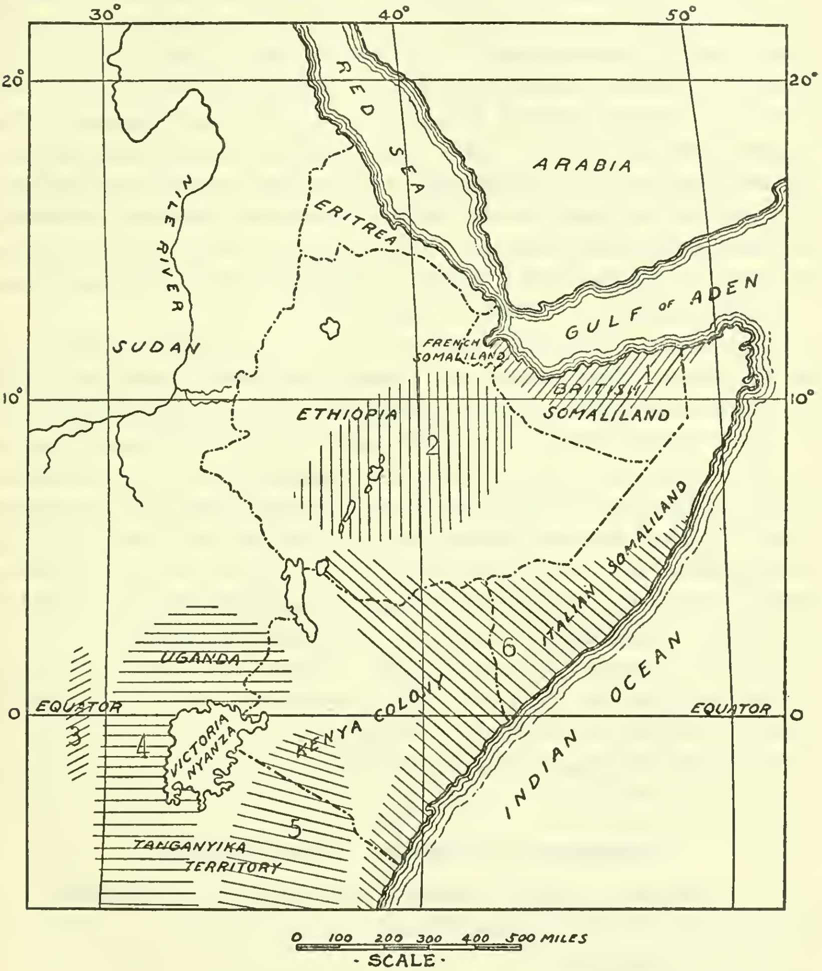

Figure 5.—The distribution of Streptopelia capicola in northeastern Africa: 1, Streptopelia capicola hilgerti; 2, Streptopelia capicola electa; 3, Streptopelia capicola dryas; 4, Streptopelia capicola tropica; 5, Streptopelia capicola anceps; 6, Streptopelia capicola somalica

The present race resembles *tropica* but has the forecheeks pure grayish, not washed with rosy, the upper parts somewhat darker, and the under wing coverts also darker.

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[37] Nov. Zool., vol. 29, 1922, p. 36.

The immature plumage of *electa* is not yet known. A male from Golba, Soddo, Ethiopia (Kovács collection) is in a late stage of the postjuvenal molt. The only juvenal feathers left are on the breast, abdomen, back, and wings. The breast feathers are dull, pale earth brown terminally banded with dirty white; those of the abdomen are dull grayish somewhat washed with brownish; the back is dark brown, the feathers narrowly tipped with buffy brown, and the old remiges are dark brown, tipped with rufous brown. A few dull brownish feathers are still present on the crown, but the rest of the feathers are bluish gray. The under wing coverts are still inclosed in their sheaths. The outermost rectrices have more than the ordinary amount of black on the basal portions of the outer webs; the black extends halfway across, while in older birds it seldom amounts to more than a third of the width of the outer web, and in some cases is wholly restricted to the inner one.

Adults vary to a considerable extent in the darkness of the back, and the under wing coverts, but usually not enough to make it difficult to identify them subspecifically except in intermediate areas. This is in contradiction to what Zedlitz[38] found, as he wrote that his specimens were not typical *electa* but reminded him of *S. decipiens griseiventris*—quite a different bird, although superficially similar. It may be that the two species hybridize occasionally and produce intermediates or that each varies in the direction of the other. Zedlitz examined 2 males and 3 females, including the type, while I have seen 10 males and 15 females, including 3 topotypes.

Zedlitz[38] records the wing length of *electa* as 149–158 (male); 146–157 millimeters (female). The present series measure 148–160 (male); 144–160.5 millimeters (female).

The male and female taken at Bodessa were apparently a mated pair according to Mearns' field notes.

STREPTOPELIA ROSEOGRISEA ARABICA (Neumann)

Turtur roseogriseus arabicus Neumann, Orn. Monatsb., vol. 12, 1904, p. 31: Lahej, Aden Protectorate, southwest Arabia.

Specimens collected:

Male, Dire Daoua, Ethiopia, December 17, 1911.

The single specimen obtained was collected by H. and F. von Zülow and obtained from them by the expedition. As far as I know this is the only record for the species in Ethiopia, and constitutes the most southwestern locality for the race *arabica*.

In his original description of *arabica*, Neumann distinguished it from typical *roseogrisea* by the fact that the under wing coverts are pale bluish gray in the former and pure white in the latter. Later [39] he further diagnosed it and wrote that the vinaceous tone of the throat and breast is more distinct in *arabica* than in *roseogrisea.* Zedlitz [40] collected several specimens in Dahlak Island and found that the only real difference between the two forms of this pigeon was the color of the under wing coverts, and that in other respects the differences were inconstant and purely individual. The question of color differences was again raised when Sclater and Praed [41] compared a single specimen of *roseogrisea* from Khartoum with a lone example of *arabica* from Khor Arbat, and found the most noticeable differences between them to be the greater amount of the vinous flush on the throat and breast, and the narrower ring of black around the neck of *arabica.* However, they record that specimens from Jedda, Arabia, and Salomona, Eritrea, have grayer under wing coverts than birds from Shendi and Khartoum on the Nile.

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[38] Journ. f. Ornith., 1914, p. 651.

The material available for the present study is small—1 bird from Aden, Arabia—practically topotypical *arabica*, the specimen listed above from Dire Daoua, Ethiopia, and 1 from 10 miles south of Jebelein, White Nile, Sudan. The latter is of the typical race, the bird from Dire Daoua is clearly referable to *arabica.* These three specimens agree with Neumann's and Sclater's conclusions as to the color of the breast and throat. However, the example from Aden has a wider, not narrower, black neckband than either of the other two.

The distribution of this bird lies largely to the north of our region, although the Aden Protectorate is latitudinally similar to the Tigre and Amhara districts of Ethiopia. The real reason why the bird is scarce or absent in the latter country is ecological. It is essentially a lowland bird of semiarid country. Elliot procured a specimen as far south as Hullier, northern Somaliland, and Blanford [42] writing of this bird under the name *T. albiventris* G. R. Gray, writes that this species is the common dove of the coastal districts of Eritrea. The typical race, which ranges westward across the Sudan to Lake Chad and Northern Nigeria, is likewise a bird of semiarid country. Thus, Bannerman and Bates [43] list three species of *Streptopelia* (*lugens hypopyrrhus*, *decipiens shelleyi*, and *roseogrisea roseogrisea*) from Cameroon and northern Nigeria, and write that of, "* * * the three species of *Streptopelia* obtained in this region * * * the present one seems to have the most northerly range nearest the desert; it is noteworthy that this is also the palest form."

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[39] Orn. Monatsb., 1904, p. 83.

[40] Journ. f. Ornith., 1910, pp. 345–346.

[41] Ibis, 1920, p. 831.

[42] Geol. and Zool. Abyss., 1870, p. 417.

[43] Ibis, 1924, p. 207.

Lynes[44] found typical *roseogrisea* to be a very common resident in north and central Darfur and western Kordofan except in the high mountainous districts.

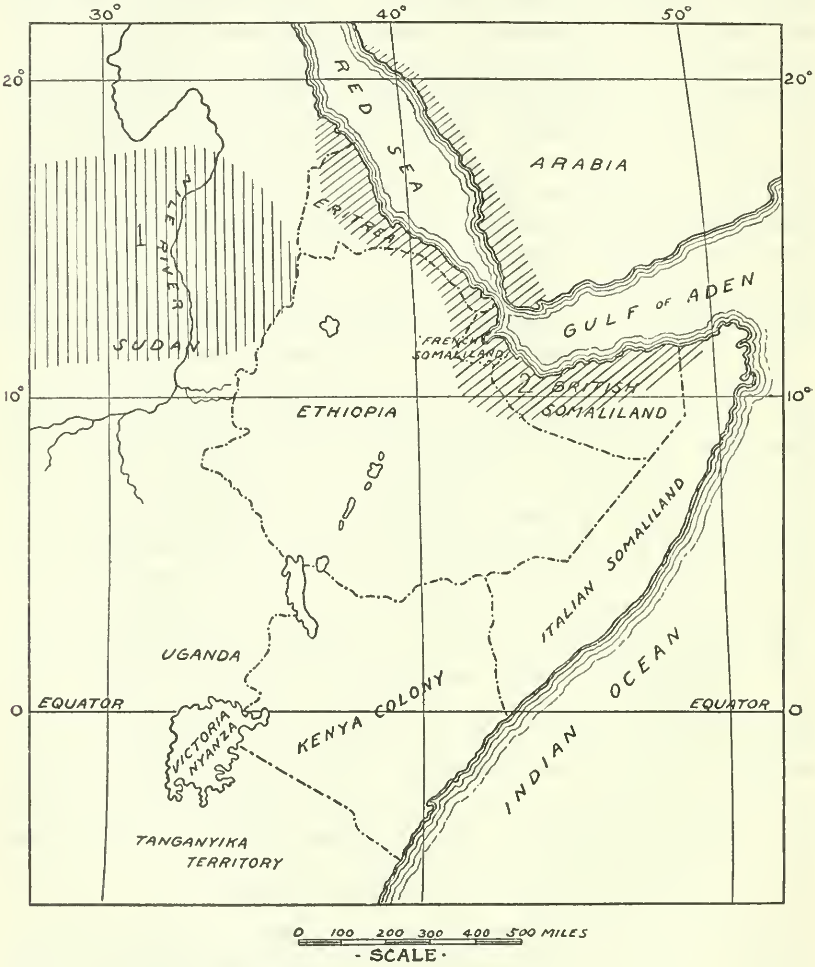

FIGURE 6.—DISTRIBUTION OF STREPTOPELIA ROSEOGRISEA IN NORTHEASTERN AFRICA: 1. STREPTOPELIA ROSEOGRISEA ROSEOGRISEA; 2, STREPTOPELIA ROSEOGRISEA ARABICA

The bird from Dire Daoua is much darker above than either of the other two. The wing lengths of the three are as follows:

Locality	Sex	Wing	Subspecies
Ethiopia, Dire Daoua	♂	150	Arabica.
Arabia, Aden	♂	158	Do.
Sudan, White Nile, 10 miles south of Jebelein.	♂	165	Roseogrisea.

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[44] Ibis, 1925, p. 575.

The Sudan specimen exceeds in size by 3 millimeters the largest measurement recorded by Neumann.

STIGMATOPELIA SENEGALENSIS AEQUATORIALIS (Erlanger)

Turtur senegalensis aequatorialis ERLANGER, Orn. Monatsb., 1904, p. 98: Menaballa, Ethiopia.

Specimens collected.

Five male adults, one female adult, one unsexed, Dire Daoua, Ethiopia, November 28, to December 22, 1911.

One female adult, Sadi Malka, Ethiopia, January 28, 1912.

One male adult, Gato River near Gardula, Ethiopia, April 12, 1912.

One male adult, Tertale, Ethiopia, June 8, 1912.

Four male adults, one male immature, Wobok, Ethiopia, June 18, 1912.

One female, immature, Lake Rudolf, Kenya Colony, July 11, 1912.

Two male adults, Indunumara Mountains, Kenya Colony, July 14-16, 1912.

One female adult, Tharaka District, 2,000 feet, Kenya Colony, August 14, 1912.

One male adult, Tana River camp No. 3, Kenya Colony, August 16, 1912.

One female adult, Tana River camp No. 6, Kenya Colony, August 21, 1912.

Soft parts: Iris, brown; bill, olivaceous black; feet, vinaceous; claws, olivaceous black.

Like most other African doves, the taxonomy of the present species has been dealt with in a variety of ways. The races have been reviewed by Erlanger[45] who separated the birds of northeast, east, South, and west Africa from the typical Senegambian ones on the basis of the pinker, less reddish coloration of the breast, head, and upper back, and grayer, less brownish rump color in the former, which he called *aequatorialis*.

Some five years later, Zedlitz[46] wrote that Erlanger had examined only one specimen of typical *senegalensis* and that with a longer series he (Zedlitz) could find no constant differences between the two races. Grant[47] likewise concluded that *aequatorialis* could not be maintained, and recognized only *senegalensis* from the African continent south of the Sahara, *aegyptiaca* from Egypt and

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[45] Journ. f. Ornith., 1905, pp. 116–118.

[46] Idem, 1910, pp. 341–343.

[47] Ibis, 1915, pp. 43–44.

Palestine, and *sokotrae* from Socotra. Hartert[48] considered Erlanger's form the same as the typical race and at the same time separated the birds of the region south of the Atlas Mountains in Algeria, Tunisia, and Morocco under the name *phoenicophila.*

In 1920 Sclater and Praed[49] once more delved into the systematics of this pigeon and not only recognized *aequatorialis* but also described another race from the Anglo-Egyptian Sudan which they named *sudanensis*, characterized by its distinctly pale coloration, the breast below the collar being pale vinous pink of a more bluish, less reddish tinge than in its nearest ally, *S. s. aequatorialis*, and also by its small size (wing 128 to 133 millimeters). Gyldenstolpe[50] and Van Someren[51] found that individual variation seemed to account for all the so-called racial characters of *aequatorialis* and consequently synonymized it with *senegalensis*. The latter author, however, more recently[52] has reversed his decision and grants Erlanger's form racial standing. Granvik[53] likewise recognizes *aequatorialis.*

The series studied in this connection, including in all some 44 specimens, of which 36 are *aequatorialis*, indicates that individual variation is unquestionably very great. Unfortunately no typical *senegalensis* are available for comparison, but the specimens collected by Mearns fall into two distinct groups—a light group (from Dire Daoua and Sadi Malka, Ethiopia, and northern Kenya Colony) and a darker, redder series from southern Ethiopia (Tertale, Wobok, and Gato River near Gardula). At first glance it would seem that two races are represented, but in this case geography fails to conform with color variation, as farther south (East Africa generally) the birds are light like those from Dire Daoua. Furthermore, the dark birds seem hardly a recognizable aggregate, as two of the Dire Daoua specimens are just about as dark as those from Wobok. The presence of darker individuals in the range of *aequatorialis* is probably the reason why many workers have concluded that that form was not valid. However, although the difference between dark and light *aequatorialis* is very marked, the darkest specimens are not as dark or as red as the colored figure of *senegalensis* given by Erlanger.[54] In that plate the coloration of *senegalensis* and that of *aegyptiaca* are alike. I have compared the darkest specimens of *aequatorialis* with some of *aegyptiaca* and find a constant difference in color. The typical form and the Egyptian one are redder below and above, and the red color extends down on the abdomen, which in *aequatorialis* is whitish.

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[48] Nov. Zool., 1916, pp. 82–83.

[49] Idem, 1916, pp. 832–834.

[50] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 311.

[51] Nov. Zool., vol. 29, 1922, p. 36.

[52] Journ. East Afr. and Uganda Nat. Hist. Soc., No. 30, July, 1927, p. 93.

[53] Journ. f. Ornith., 1923, Sonderheft, p. 49.

[54] Idem, 1905, pl. 5, fig. 1.

The form *sudanensis* seems untenable. A specimen from Karkoj, Blue Nile, Sudan, is not in any way distinguishable from *aequatorialis.* Furthermore Lynes [55] writes that the differences between *aequatorialis* and *sudanensis* are very small, as out of a considerable series from the Nile very few birds match the description or type of the latter race, and concludes that the name is merely a convenience for further inquiry.

It appears that there are in all seven races, of which two are Asiatic—*cambayensis* and *ermanni*—and five are African. The African races are as listed by Sclater [56] with the exception that *sudanensis* is not distinct from *aequatorialis*, and with the addition of the two North African (palearctic) races, *phoenicophila* and *aegyptiaca* Of all the forms, *aequatorialis* is clearly the most variable. Some of the variations are remarkable. Two specimens from central Tanganyika Territory (Kilosa and Morogoro) and another from Mozambique (Lumbo) are light and pale enough to match the description of *sudanensis*, while from all around them are darker birds.

The distribution of the subspecies of the laughing dove is as follows:

1. *S. s. senegalensis.*—Senegal to Northern Nigeria, intergrading with *aequatorialis* in the Lake Chad region.
2. *S. s. aequatorialis.*—From Southern Nigeria through Darfur, Kordofan, Bahr el Ghazal to the Nile Valley, Ethiopia, Eritrea, the Red Sea Province of the Sudan and southern Arabia; south to the Cape Province. Absent in forested areas, such as the Congo basin, and not found at altitudes above 6,000 feet.
3. *S. s. sokotrae.*—Confined to the island of Socotra.
4. *S. s. phoenicophila.*—The date palm groves of Algeria, Tunisia, and Morocco south of the Atlas Mountains.
5. *S. s. aegyptiaca.*—Egypt and the lower Nile valley south to the Nubian desert.
6. *S. s. cambayensis.*—Tropical India from the foothills of the Himalayas to the Malabar coast, east to the Hoogli and Ganges Rivers (after Hartert).
7. *S. s. ermanni.*—Turkestan, Baluchistan, Afghanistan, Persia, and southeastern Arabia (Muscat).

The immature female collected at Lake Rudolf on July 11 is in an early stage of the postjuvenal molt. The only new (adult) feathers present are the five outermost secondaries and their upper coverts

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[55] Ibis, 1925, p. 576.

[56] Syst. Avium Ethiop., 1924, p. 170.

(greater, median, and lesser), and five black, rufescent-tipped feathers on the breast. In all other respects the plumage is of the juvenal type, and the bird is small, not more than four-fifths grown.

According to Blanford[57] this dove is most abundant in Ethiopia in the subtropical belt, from 3,000 to 6,000 feet (900 to 1,800 meters), but occurs both above and below these limits.

Mearns observed this species in the following localities: Gidabo River, March 15–17, 10 birds; the Abaya Lakes, March 18–26, 34 seen; near Gardula, March 26–29, 2; Gato River, March 29 to May 17, 25 birds; Tertale, June 7–12, 60; El Ade, June 12, 10 seen; Turturo, June 15–17, 4 noted; Anole, June 17, 4; Wobok, June 18, 50 seen; near Saru, June 19, 4; Yebo, June 20, 2 birds; Karsa Barecha, June 21, 25 seen; Malata, June 22, 25 birds; Boran, Lower Chaffa Village, June 23, 6 seen; Upper Chaffa Village, June 24, 25 birds; Chaffa, June 24–25, 20 seen; Indunumara Mountains, July 14–18, 120 noted; plains at base and south of Endoto Mountains, July 19–24, 125 birds; Er-re-re, July 25, 50 seen; Le-se-dun, July 26, 10 noted; Malele, July 27, 10 birds; 18 miles south of Malele, July 28, 10 seen; Guaso Nyiro River, July 31 to August 3, 6 birds; Lekiundu River, August 4–8, 20 seen; Kilindini and Meru, August 10, 10 birds; from Tharaka to Athi River, August 11 to September 2, from 4 to 25 birds seen daily. On August 29 when crossing the Athi River to Donio Sabuk, Mearns observed a flock of about 1,000 birds.

OENA CAPENSIS CAPENSIS (Linnaeus)

Columba capensis LINNAEUS, Syst. Nat., ed. 12, vol. 1, p. 286, 1766: Cape of Good Hope.

Specimens collected:

One male, adult, Sadi Malka, Ethiopia, February 2, 1912.

One female, adult, Hawash River, Ethiopia, February 8, 1912.

One female, adult, White Lake Abaya, Ethiopia, March 18, 1912.

One male, adult, Malata, Ethiopia, June 22, 1912.

One male, adult, Chaffa, upper village, Ethiopia, June 24, 1912.

Nine males, adult, 3 females, adult, and 1 female, immature, Hor, 3° 19′ N., Kenya Colony, February 27–28, 1912.

Three females, adult, two females, immature, 18 miles southwest of Hor, Kenya Colony, July 1–2, 1912.

One male, adult, Dussia, Kenya Colony, July 3, 1912.

One male, immature, Lekiundu River, Kenya Colony, August 5, 1912.

This dove inhabits the whole of the Ethiopian region and is represented in Madagascar by a geographic race *aliena* Bangs. The latter differs from the continental birds in having the wings and tail slightly longer, the scapulars, mantle, and lower rump considerably darker; the gray of the head extending down to the mantle instead of being replaced by brown on the nape as in *capensis;* the black bands on the rump darker and heavier; and the rufous on the outer web of the outermost primary less extensive.

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[57] Geol. and Zool. Abyss., 1870, p. 417.

Oberholser[58] separated the birds from the region north of the Zambezi River on the basis of paler, clearer, more grayish coloration, and called the northern race *anonyma.* Subsequent students of East African birds have practically all agreed that *anonyma* is not a tenable form as the characters do not hold. For the purposes of the present study I have assembled and examined 88 specimens of this dove, of which 25 are of the Madagascan form *aliena* and the remaining 63 are from the mainland of Africa. No constant geographic differences are to be found in the latter group. (The series contain birds from South Africa, Mozambique, Tanganyika Territory, Kenya Colony, Uganda, Sudan, British Somaliland, Ethiopia, and "West Africa.")

The young in first plumage are alike in both sexes and lack the black throat patch. The forehead is whitish, the feathers of the crown are broadly tipped with orange rufous, subterminally edged with fuscous brown; upper parts dull ashy brown coarsely blotched with white and pale buff, most of the feathers crossed by narrowly exposed black bars, succeeded by buff, and tipped with white, the middle and greater upper wing coverts showing the most white on their tips; secondaries tipped with buff or reddish buff with some white on the edges; primaries tipped with reddish buff and narrowly edged with white; central rectrices pale grayish drab, obscurely banded across with darker, becoming blackish apically; under parts white except the breast, under tail coverts, and under wing coverts; the breast pale ashy brown banded narrowly with fuscous and broadly edged with pale buff and whitish; under tail coverts blackish, tipped with buff; under wing coverts rufous, the axillars black. The adults of both sexes lack the pale blotches on the wings and interscapulars, the males being more grayish and the females more drab color above.

The postjuvenal molt begins with the forehead, chin, throat, and breast. A young male from Lekiundu River, Kenya Colony, August 5, is beginning to acquire the black throat patch of the adult plumage and also has a few black feathers on the forehead. The rest of the body shows no sign of molt. This molt is still imperfectly understood. The available material gives no indication as to whether or not the remiges and rectrices are affected. That there is something peculiar about the molts of this bird seems to be indicated by the remarkable case recorded by Granvik[59] who lists a male bird in an, "* * * advanced phase of molt and the curious thing is that the new rectrices have already grown to two-thirds of their future length while the old rectrices are still left. One might almost say that the bird has two tails, which are, moreover, separated by an interstice, so that one can easily discern the old one and the new one." This instance sounds hardly credible and certainly can not represent the normal state of affairs. However, it does indicate that the molts of this species are worth investigating. This my material does not allow me to do.

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[58] Proc. U. S. Nat. Mus., vol. 28, 1905, p. 843.

The adults vary greatly in shade of coloration and also in the color of the iridescent wing spots, which are blue in some individuals and reddish purple in others. Both extremes are found side by side in all parts of Africa.

In size, the variations range as follows: Males: Wing 98–107; tail 125–144.5; culmen 13–15 millimeters. Females: Wing 96–105; tail 120–142; culmen 13–15 millimeters.

Heuglin found this dove in the coast lands of Eritrea and French Somaliland, south to the Gulf of Aden, while in the interior of Ethiopia he records it up to altitudes of 7,000 feet (2,100 meters). It is possible that the Danakil coastal records may be erroneous, as Zedlitz[60] lists this bird from west of the eastern Eritrean-Ethiopian escarpment, but not from the Danakil country to the east of it. However, Hilgert recorded it some years before from Danakil. It may be that the species is partly migratory there, as during the dry season the low coastal country is very arid.

In this connection it is interesting to note that Blanford[61] writes that "* * * in December, January, and February there were none whatever near Annesley Bay, but after the rain in the latter month numbers appeared, and in May and June it was one of the commonest birds about Zulla and Komayli. It also abounded in Samhar and the tropical portion of Habak, becoming, however, very rare or wanting in the subtropical or Anseba Valley."

In Gallaland and southern Somaliland the bird is common. Erlanger[62] noted it frequently throughout his journey from Zeyla to Kismayu. Antinori and Ragazzi and others found it to be numerous in Shoa.

The breeding season is rather variable and prolonged. Erlanger obtained an egg on June 9 in the Hawash region, while Zedlitz records the courtship season in northern Ethiopia as being in February. Granvik took an egg from the oviduct of a bird collected at Kisumu,

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[59] Journ. f. Ornith., 1923, Sonderheft, p. 57.

[60] Idem, 1910, p. 352.

[61] Geol. and Zool. Abyss., 1870, p. 418.

[62] Journ. f. Ornith., 1905, pp. 135–136.

Kenya Colony, on August 19. Lynes obtained a female ready to lay at Fasher on March 19, and a nest and two eggs at Zalingei on October 30.

The widespread abundance of this little dove is attested by the fact that it was observed almost daily on the march from Aletta, Ethiopia, to the Athi River, Kenya Colony. The definite records found in Mearns' field notes are: Aletta, March 13–15, 4 birds; Loco, March 15–17, 25; the Abaya Lakes, March 18–26, 310 seen; near Gardula, March 26–29, 4 birds; then comes a break which is rather surprising. During the seven weeks spent at Gato River (March 29 to May 17) none of these birds were recorded. This probably does not mean that none were seen, but that, wearying of constantly entering this bird in his notes, Mearns omitted it during this period. The next records are: Turturo, June 15–17, 6 seen; Anole, June 17, 10 birds; Wobok, June 18, 50; near Saru, June 19, 100 seen; Yebo, June 20, 200 noted; Boran, Lower Chaffa Village, the Indunumara and Endoto Mountains, Er-re-re, Le-se-dun, Malele, the Guaso Nyiro River, and Meru, June 23 to August 9, seen in numbers every day; Tana, Thika, and Athi Rivers, August 23 to September 1, seen in small numbers daily.

TYMPANISTRIA TYMPANISTRIA FRASERI Bonaparte

Tympanistria fraseri BONAPARTE, Consp. Av., vol. 2, p. 67, 1857: Fernando Po.

Specimens collected:

Male and female, Aletta, Ethiopia, March 9, 1912.

Female, Meru Forest, near Mount Kenia, Kenya Colony, August 10, 1912.

The two birds from Aletta appear to be the fifth and sixth known records for Ethiopia and the northernmost for the species. This dove was first taken in Ethiopia by Lord Lovat, who obtained a male at Wama, in the southern part of the country, March 12, 1899.[63] Two years later (March 17, 1901) Oscar Neumann procured a female at Anderatscha in Kaffa,[64] which was the most northerly record until the present birds were captured at Aletta. At about the same time Erlanger [65] obtained two more, a male at Gigiro, Djamdjam district (December 25, 1900) and a female at Wonda, Abaya Lakes region (December 5, 1900). As far as I have been able to discover these four are the only Abyssinian specimens known other than the present two. However, Hartert [66] says in his notes on the races and nomenclature of this bird, that the combined series in the Tring Museum and the British Museum contains Abyssinian material. It may be that this refers to Lord Lovat's specimen, or it may be that there are other unpublished records. Salvadori never listed this dove in his papers on the avifauna of Shoa, and likewise it is not mentioned by Von Heuglin in his great work or by Rüppell.

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[63] See O. Grant, Ibis, 1900, p. 334.

[64] Journ. f. Ornith., 1904, p. 349.

[65] Idem, 1905, p. 132.

[66] Nov. Zool., vol. 25, 1918, p. 435.

The most detailed statement that can be made regarding the distribution of this species is that it occurs north to Aletta and Anderatscha in Ethiopia, while to the westward it is not known north of the forested areas in Uganda, being entirely absent in the Anglo-Egyptian Sudan (Nile Valley, Kordofan, and Darfur) apparently not living north of the outlying patches of the Congo forest, but in the western Sudan once more ranging northward around Lake Chad, whence its northern limit extends to Sierra Leone. The southern limit of its range is marked by the valley of the Zambesi River, south of which it is replaced by the typical race. However, within this vast area it is by no means ubiquitous, being entirely confined to forested areas, wooded stream banks, and here and there in the denser thickets in the parklike savannas. The absence of the bird from the Anglo-Egyptian Sudan is probably wholly ecological in its significance, and it may yet be found in some of the few small wooded areas in the Bahr-el-Ghazal district.

The present subspecies is characterized by the color of the upper parts which are darker than in typical *tympanistria*. In studying this species I have examined 37 specimens, of which only 2, a single male and 1 female, are *tympanistria*, the rest being *fraseri*. The metallic wing spots are bluish or purplish blue in most of the birds but in a few they are green. In one case, a male with blue spots and one with green ones were collected together (at Kome, Mwanza, Tanganyika Territory) so that geography, season, and wear have nothing to do with the variation. Occasionally the spots are absent in one wing, or at least fewer in numbers on one side than the other, recalling the aberrant, spotless individual on which Hartlaub[67] based his *Tympanistria virgo*. Some of these cases seem better explained by the loss of those feathers during the process of preparing the specimens than by their actual absence in life.

The size of the birds varies considerably but not geographically. According to Hartert[66] southern birds average larger than more northern ones, but this difference is not constant. The wing length varies from 108 to 119 millimeters in the males, and from 108 to 113 millimeters in the females.

Van Someren[68] has described the plumages of this species in detail. My observations confirm his as to the fact that the birds change from the barred plumage of immaturity (juvenal stage) to the adult type in one molt, thereby assuming the final plumage stage in the second year. However, when in fresh first adult plumage, the female birds have dull brownish tips to many of the feathers of the throat and breast, and their age may be told in this way. The female from Aletta has such feathering. Of course, with wear, the first adult plumage becomes indistinguishable from subsequent ones. The male from Aletta is in postjuvenal molt and has a rather curious appearance as a consequence, being about half in one stage, half in the other.

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[66] Nov. Zool., vol. 25, 1918, p. 435.

[67] Ibis, 1886, p. 2.

[68] Journ. E. Afr. and Uganda Nat. Hist. Soc., No. 32, January, 1928, p. 162.

TURTUR AFER MEARNSI Sclater and Mackworth-Praed

Turtur afer mearnsi SCLATER and MACKWORTH-PRAED, Ibis, 1920, p. 836: Roguecha, near Adis Abeba, Ethiopia.

Specimens collected:
Male, Sadi Malka, Ethiopia, January 29, 1912.

As pointed out by Sclater and Mackworth-Praed,[69] there are two species of blue-spotted doves which occur in the same areas in Ethiopia—a black-billed, lighter-backed bird with a vinaceous-pink breast and a pure bluish-gray occiput and nape—*T. abyssinicus;* and a darker-backed species with a longer, stouter, yellow-tipped bill, a brownish-gray occiput and nape, and a brownish-tinted breast—*T. afer*. While the two have similar geographic ranges on a map, in reality, the lighter form, *abyssinicus* is more a denizen of the desert scrub and arid barrens generally than is the darker *afer*. The latter is found in all sorts of country except dense forest and, while occurring to some extent in the ecological habitat of *abyssinicus*, is more restricted to less arid savanna or grassy country. The two species are very closely related, and were it not for the fact that they not infrequently occur side by side, might be even considered conspecific.

Sclater[70] recognizes three forms of *T. afer*, as follows:

1. *T. afer afer*.—From Senegal to Portuguese Guinea and probably to the Bahr el Ghazal. The only additional evidence that has come to my notice is negative; that is, Lynes[71] did not find this bird in Darfur, a fact which raises some doubt as to its reaching the Bahr el Ghazal.

2. *T. afer kilimensis*.—From Sierra Leone to Angola, eastward to Uganda, Kenya Colony, Nyasaland, Southern Rhodesia, and the Zambesi Valley. The range of this form in East Africa is interest-

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[69] Ibis, 1920, p. 835.

[70] Syst. Avium Ethiop., 1924, p. 172.

[71] Ibis, 1925, p. 577.

ing. It is widespread in Tanganyika Territory but stops at the Kenya border, penetrating into that country only in the Kavirondo and Kisii districts, extending northward through Uganda.

3. *T. afer mearnsi.*—The highlands of Ethiopia and Shoa.

Rothschild [72] confused *T. afer* and *T. abyssinicus* (as did all workers until Sclater pointed out the differences) and described the West African bird as *T. afer sclateri* on the differences between it and *T. abyssinicus.* Sclater and others naturally considered *sclateri* a synonym of *kilimensis* with which the original description agreed most closely. Recently Gyldenstolpe [73] decided that *sclateri* is distinct from *kilimensis* although very similar to it, differing from the latter in having darker brown upper parts and in having the flanks and abdomen more whitish, less tinged with cinnamomeous. In attempting to decide the validity of *sclateri*, I have studied a series of 8 birds from Cameroon, 3 from Liberia, 1 from "West Africa," 2 from the eastern Belgian Congo, 1 from Uganda, 1 from "East Africa," 2 from Tanganyika Territory. I find that the characters given by Gyldenstolpe do not hold any too well. The color of the abdomen in birds from Cameroon and Liberia varies from noticeably cinnamomeous to practically pure white. The shade of the upper parts is also variable. According to Gyldenstolpe *sclateri* ranges across Africa as far east as Tanganyika Territory. A specimen from Bungu, Usambara Mountains, eastern Tanganyika Territory is more or less intermediate between the characters of *sclateri* and *kilimensis*, having the lighter upper parts of the latter, and the whiter under parts of the former. Until more adequate series are available it seems more in accordance with the facts to consider *sclateri* a synonym of *kilimensis.*

In his field book Mearns entered a great many observational records of what he called "*Chalcopelia afra.*" These probably refer to the present species. If so, he observed two races, *mearnsi* in Ethiopia (Aletta to Boran, March 7 to June 23), and *kilimensis* in Kenya Colony (Endoto Mountains to Athi River, July 21 to August 31).

Erlanger [74] found the breeding season to be in May in Ennia-Gallaland, where, at Ali Dera on May 28, he found a nest with two eggs.

TURTUR CHALCOSPILOS CHALCOSPILOS (Wagler)

Columba chalcospilos WAGLER, Syst. Av. Columba, p. 82, 1827: "Terra Caffrorum"; i. e., Eastern Cape Province.

Specimens collected:

Two males and one female, one immature, Dire Daoua, Ethiopia, October 17 to December 21, 1911.

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[72] Bull. Brit. Orn. Cl., vol. 38, 1917, pp. 25–26.

[73] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 312.

[74] Journ. f. Ornith., 1905, p. 133.

Two males and one female, Hawash River, Ethiopia, February 11, 1912.

Five males and four females, Gardula, Ethiopia, March 27–28, 1912.

Two females, Gato River near Gardula, Ethiopia, April 21 to May 11, 1912.

One male, Bodessa, Ethiopia, May 24, 1912.

One male, Endoto Mountains, Kenya Colony, July 23, 1912.

This series contains the types and paratypes of *T. chalcospilos intensa* (Mearns) and *T. chalcospilos media* (Mearns), and one specimen that Mearns considered as *acanthina* Oberholser. The present species has been divided into as many as nine different races, eight of which are apparently untenable. The Damaraland form, *volkmanni*, which I have not seen, is regarded as distinct by Sclater, who has studied these races more recently and with better material than anyone else. Besides the above-listed specimens, I have examined 15 others, making 35 in all, an admittedly inadequate series. However, even within this series, individual, nongeographic variation is great enough to cast serious doubt on the validity of such forms as *acanthina*, *media*, *intensa*, and *somalica*.

Some of the forms were described on erroneous assumptions. For instance, Oberholser[75] described *acanthina* on the assumption that west African birds were typical *chalcospilos*. He was of the opinion that Wagler's description was based on "La Tourterelle du Sénégal" of Brisson.[76] However, more recently Sclater[77] carefully examined Wagler's original description and found that he "* * * undoubtedly based his description chiefly on Levaillant's plate, and that the type locality should be South Africa, as he states in his last paragraph: 'Habitat in Africa meridionali satis frequens in terra Caffrorum porro in Senegambia' * * *." Therefore, it follows that the eastern Cape Province (Caffraria) should be the type locality. Furthermore, the green-spotted wood dove is not known to occur in any part of West Africa except Angola and Loango, so Senegal could hardly be the type locality of *chalcospilos*.

Reichenow's name *caffra* therefore becomes a direct synonym of *chalcospilos*, having the same type locality.

Erlanger's form *somalica* described[78] from Salakle, southern Somaliland, seems a very well marked form if the colored plate only be examined. However, a specimen from British Somaliland is certainly not in any way different from others from Ethiopia, Kenya Colony, and East Africa generally.

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[75] Proc. U. S. Nat. Mus., vol. 28, 1905, p. 845.

[76] Ornith., vol. 1, 1760, p. 122, pl. 10, fig. 1.

[77] Bull. Brit. Orn. Cl., vol. 42, 1922, p. 118.

[78] Journ. f. Ornith., 1905, p. 134.

Of *intensa* and *media* I am in a position to form definite conclusions based on a critical study of typical material. These two forms are said[79] to be darker than birds from Kenya Colony and Tanganyika Territory. It is true that the series of these two Ethiopian races average slightly darker above and more rufescent below than a series farther south (Kenya, Uganda, and Tanganyika Territory), but this difference is not constant, some individuals from East Africa (practically typical "*acanthina*") being just as dark. The southern Abyssinian form *media* is said to differ from *intensa* of the Hawash region in being paler throughout and having more bluish purple in the wing spots. The type specimens of the two forms differ only in the wing-spot character, that of *media* having some of the spots green and some purplish-bluish green, while that of *intensa* has them all greenish. The two paratypical series, however, show this difference to be inconstant.

In this connection it is worthy of mention that Van Someren[80] found that specimens from Lumbo, Mozambique, were darker on the underside than East African (Kenya Colony) birds and that the wing spots varied in color; in one individual they were purplish blue, in another half green, half blue, and in still another, all green.

The Ethiopian birds do not differ subspecifically from those of Kenya Colony and farther south.

In the first real revision of this species, Erlanger[78] admitted that, although he recognized five forms, the differences between any two were not well defined and could not be made out except with large series. The present series does not justify any of the eastern races, and, to judge from publications, the series in the British Museum and at Tring apparently are not large enough to illustrate the racial characters. When races are based on such minute average differences, it becomes a practical impossibility to recognize them.

Two of the birds from Gardula (one male and one female) are molting the outermost pair of primaries and some of the inner secondaries.

APLOPELIA LARVATA LARVATA (Temminck)

Columba larvata Temminck, Pig., Colombes, p. 71, pl. 31, 1810: Le pays d'Antiniquois; i. e., Knysna, Cape Province.

Specimens collected:

Female, Meru Forest, near Mount Kenia, Kenya Colony, August 10, 1912.

Soft parts: Bill, black; feet, vinaceous; claws, dark brown.

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[78] Journ. f. Ornith., 1905, p. 134.

[79] Mearns Proc. U. S. Nat. Mus., vol. 48, 1915, p. 384.

[80] Nov. Zool., vol. 29, 1922, p. 36.

Bannerman[81] has reviewed the species and races of this genus, and, in the absence of sufficient material, I follow his conclusions. The present species has two geographic forms, the typical one ranging from South Africa (except the western portion) north through eastern Rhodesia, Nyasaland, Tanganyika Territory, and Kenya Colony to Mount Kenia and Mount Elgon; while another smaller form, *bronzina*, which I have not seen, is said to occur in the highlands of Ethiopia and Shoa. This pigeon is entirely restricted to dense forests and its range is therefore a very discontinuous one. Although true forest areas in tropical East Africa are largely confined to mountainous spots the bird is not to be considered a highland form as it has been taken in the Taveta forest in Kenya Colony, and in the lowland forests in Natal, the Cape Province, and the Transvaal.

Neumann's race *kilimensis* is identical with *larvata* and the former name is a straight synonym of the latter.

Aplopelia larvata larvata is definitely known from the following localities in Kenya Colony: Taveta, Nairobi, Ngong, Kyambu, Kakamegos, Mau, Escarpment, Cherangani, West Elgon, Meru, and Mount Kenia. In Tanganyika Territory it has been recorded from only four mountain masses—Kilimanjaro, Meru, the Usambara (Mlalo), and the Uluguru (Bagilo, Madazi, and Nyange) ranges.

This species is said to go through a sequence of three plumages in the course of its life, the full adult type being acquired at the age of two years. The juvenal plumage is described by Van Someren[82] as rufescent brown, more ochraceous on the head, throat, and abdomen, more blackish on the mantle and wings, each feather with two or more blackish bars. This plumage is represented in the series examined by a young male (Mus. Comp. Zoöl. 237531) from Nyange. Uluguru Mountains, Tanganyika Territory. It has the forehead ochraceous white, the feathers barred subterminally with fuscous; the crown and occiput deep fuscous narrowly tipped with rufous brown, the hind neck and nape deep fuscous brown indistinctly barred with fuscous black; the scapulars, interscapulars, back, wings, rump, and upper tail coverts very dark olive fuscous brown, each feather terminally banded with rufous; central rectrices dark olive fuscous brown, the lateral ones similar, but very broadly tipped with slate gray; sides of head ochraceous barred with brown; chin and throat ochraceous white, unbarred; lower throat and breast rufous banded with fuscous black; abdomen, flanks, thighs, and under tail coverts fuscous basally, widely tipped with rufous, the tips being so wide that the basal color is entirely concealed by the overlapping feathers. A considerable number of the body feathers still have the downy neossoptiles attached to their distal ends. These nestling feathers are whitish.

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[81] Ibis, 1916, pp. 1–16.

[82] Journ. East. Afr. and Uganda Nat. Hist. Soc., January, 1928, p. 170.

The second plumage I have not seen, but it is described by Van Someren [82] as similar to the specimen described above. Yet, the presence of the downy neossoptiles still clinging to the feathers of this bird make it obviously impossible to consider it as anything but the juvenal plumage.

In the adult stage the sexes are similar, but the males are more vinaceous, the females more rufescent below, and the latter have the forehead more grayish, less pure whitish than the former.

The nape and shoulders vary individually, regardless of sex, from purplish bronzy to bluish green, and even bright greenish. The lower throat and the breast also vary from greenish bronze to bright rufescent with a suggestion of a golden sheen. The birds vary considerably in size, the series examined (eight birds from Kenya Colony, Tanganyika Territory, and South Africa) having the following wing lengths: Males 146–156 and females 141–148 millimeters.

VINAGO WAALIA (Meyer)

Columba waalia F. A. A. Meyer, Syst.-Sum. Uebers. Zool. Entdeck., p. 128, 1793: Tcherkin, near Lake Tsana.

Specimens collected:

Male and female, Botóla, Sidamo, Ethiopia, March 5, 1912.
Female, Aletta, Sidamo, Ethiopia, March 8, 1912.

A series of 15 specimens from Ethiopia, British Somaliland, the Sudan, and "West Africa" indicates that there are no geographic races of this fruit pigeon. Neumann [83] described a form from near Lake Tata, Gelo River, Sudan, which he named *cinereiceps*, and which is not mentioned by Sclater in the Systema Avium Ethiopicarum. According to its describer, *cinereiceps* differs from true *waalia* in having the head and neck pure ashy gray, almost without any greenish tone; the upper parts more olive green, less yellowish; the belly lighter yellow; and the tarsal feathering, with only a few yellow feathers, almost entirely white. West African birds are said to be more like *cinereiceps* than *waalia*. This subspecies of Neumann's has been generally overlooked by students of African birds, but as the form is apparently not tenable no harm has been done thereby. Sclater and Praed [84] write that they have seen no specimens from the type locality, but can find no "* * * constant distinction in birds from the Sobat River or any other locality." Lynes [85] calls the birds of Darfur *waalia* and makes no mention of *cinereiceps*. Three Sudanese examples in the Museum of Comparative Zoölogy (Fazogli, Blue Nile, and Dinder River) are not different from Ethiopian specimens (including one practically topotypical individual). As far as I know, Zedlitz[86] is the only author who recognizes the two forms of this bird, but his very evidence contradicts the racial validity of *cinereiceps*, as he writes that his two specimens (from Ela Bered, extreme *northeastern* Ethiopia) approach *cinereiceps* in coloration, having practically pure gray heads and necks. Geographically his birds should have been closer to typical *waalia*.

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[82] Journ. East. Afr. and Uganda Nat. Hist. Soc., January, 1928, p. 170.
[83] Journ. f. Ornith., 1904, p. 341.
[84] Ibis, 1920, p. 826.
[85] Idem, 1925, p. 578.

If we study the characters of *cinereiceps* one by one we find that each varies individually without regard to locality, sex, age, or season. Thus, the lack of greenish color on the head and neck, the presence or absence of yellow on the tarsi, the amount of yellow or olive-green on the upper parts, all vary considerably. Zedlitz[86] found that his northeastern Abyssinian birds agreed with one from Togo, West Africa, a fact which further indicates the absence of correlation between geography and racial characters. *V. w. cinereiceps* can not be recognized in the light of present knowledge.

The only other attempt at subspecific splitting is the suggestion made by Van Someren,[87] who writes that the Jubaland birds probably represent a distinct race. I have seen no material from Jubaland or southern Somaliland and so can not form an opinion on this point. Two specimens from British Somaliland in the Museum of Comparative Zoölogy are very slightly paler than the average, but can be matched by some Ethiopian (true *waalia*) examples. Erlanger[88] writes that two birds collected at Massowa by Schrader are somewhat lighter colored on the upper parts than his series from southern Ethiopia and Gallaland, but that the difference is so very faint that he prefers not to describe a geographic form of such slight character on two specimens. The two from British Somaliland probably agree with those from Massowa, but the birds do not differ enough to warrant nomenclatural recognition.

The geographical distribution of *V. waalia* extends from Senegal through Northern Nigeria, the Sudan to Uganda, Kenya Colony, Ethiopia, Eritrea, Somaliland, Socotra, and the Aden Protectorate, southwestern Arabia. To attempt anything like a detailed account of the occurrence of this pigeon in any one district is rendered difficult by the fact that the birds wander about a great deal, their presence being largely correlated with the ripening of certain wild fruits, particularly the wild figs. The species is sometimes found in forests.

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[86] Journ. f. Ornith., 1910, p. 339.
[87] Journ. E. Afr. and Uganda Nat. Hist. Soc., January, 1928, p. 176, footnote.
[88] Journ. f. Ornith., 1905, p. 111.

but usually in more open, parklike savanna country or along wooded stream banks. If a fruit-bearing tree be growing in the middle of a wide expanse of treeless country, the pigeons will be found on it just as well as on others less isolated. Van Someren[89] writes that it " * * * is an undoubted fact * * * that in a given locality where certain fruit trees come into bearing with regularity or fixed seasons that one can count on green pigeons being there at that particular time. Their presence is thus governed largely by the food supply."

In Ethiopia this species has been found chiefly in the subtropical belt, more rarely in the highlands, and not in the hills above 9,000 feet (2,700 meters). Blanford[90] found it at altitudes of from 4,000 to 6,000 feet (1,200 to 1,800 meters) in the passes below Senafé, but in the lower Lebka valley it was seen as low as 2,000 feet (600 meters). Neumann[83] found it up to approximately 9,000 feet (2,700 meters), the highest altitude from which it has been reported. Erlanger[88] observed it chiefly in valleys covered with rich vegetation, but also, less commonly, in the highlands. The species has been found at Ela Bered (between Asmara and Cheren), the extreme northern tip of the Tigre district, and southward across Ethiopia to the southern part of the Abaya Lakes district, southern Gallaland and into Kenya Colony, where it occurs only in Jubaland and the northern frontier, extending westward through the valley of the Sobat to the Nile system and thence to the northern and eastern provinces of Uganda.

At Aletta, March 7–13, Mearns saw 10 of these birds, in addition to the 1 collected; near Gato River, March 29 to May 17, he saw 4 individuals.

VINAGO CALVA BREVICERA (Hartert and Goodson)

Treron calva brevicera Hartert and Goodson, Nov. Zool., vol. 25, p. 353, 1918: Moschi, Kilimanjaro district.

Specimens collected:

Female, Tana River, above camp No. 4, Kenya Colony, August 18, 1912.

Male and female, Tana River, camp No. 5, Kenya Colony, August 19–20, 1912.

Female, Escarpment, 7,390 feet (2,200 meters), Kenya Colony, September 9, 1912.

Soft parts (sexes alike): Iris blue, with an outer ring of brownish red; bill yellowish on basal half, greenish white on distal half; feet red; claws bluish gray or pale blue, dusky at the tips.

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[83] Journ. f. Ornith., 1904, p. 341.

[88] Idem, 1905, p. 111.

[89] Journ. E. Afr. and Uganda Nat. Hist. Soc., January, 1928, p. 173.

[90] Geol. and Zool. Abyss., 1870, pp. 418–419.

The material available for study (36 specimens of 5 races) is not sufficient to form the basis of a review of the many forms of this fruit pigeon, but the question has been gone into fairly recently by Hartert and Goodson,[91] and their conclusions are corroborated by the present series. Since their work, two more races have been described, *granviki*, Grote[92] and *vylderi*, Gyldenstolpe.[93] Of these I have seen one specimen of the former, which I find to be recognizable, and none of the latter. Assuming both to be good, there are at present no less than 11 valid subspecies of this bird. Besides these, Hartert and Goodson record one or two insufficiently known (and therefore unnamed) races from southwestern Ethiopia.

In the territory under discussion in this paper, the species occurs in southwestern Ethiopia, thence south (through Turkanaland [?] no records) to Uganda east to Elgon and to the Mau Escarpment, the Northern Guaso Nyiro, Mount Kenia, and Taveta, south into Tanganyika Territory. Only two named forms are found in Kenya Colony—*brevicera*, which occupies the territory east of Rift Valley and north to the Northern Guaso Nyiro and Mount Kenia, intergrading in the southern Sotik district with *granviki*, and the western race *salvadorii* which lives in Uganda east to the western side of the Rift Valley in Kenya Colony (Mau). More material is needed from southwestern Ethiopia to clarify the relationships of the birds found there, and also from the country between Ethiopia and Uganda, from which the species is still unknown but in which it must occur, bridging the gap between the two countries.

Madarász[94] described a fruit pigeon from Mujenje, Uganda, which he called *Vinago gibberifrons*. This name appears to have been overlooked by most workers on African birds and is not listed or disposed of otherwise by Sclater in the Systema Avium Ethiopicarum. Judging from the description and the exceedingly inadequate figure, it seems that *gibberifrons* is nothing but a rather unusual individual of *salvadorii*. The characters of this so-called species are an unusually indented outline (viewed laterally) of the naked cere and base of the bill, which are said to be very wide; also that the forehead is swollen, forming a distinct bump in profile. These characters might easily be individual or even the result of the skinning operation. The form is probably no good, but the name can not therefore be ignored. It should be synonymized with *Vinago calva salvadorii*.

The present specimens show considerable variation in size. The male has the following dimensions: Wing 166, tail 98, culmen 19, and tarsus 21 millimeters. The females: Wing 154, 158, 164.5, tail 78, 90, culmen 17, 20, tarsus 22, 23.5, and 24 millimeters.

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[91] Nov. Zool., vol. 25, 1918, pp. 349–354.

[92] Journ. f. Ornith., 1924, p. 102: Ukerewe Is., Victoria, Nyanza.

[93] Bull. Brit. Orn. Cl., vol. 44, 1924, p. 36: Quenvep, Great Namaqualand, S. W. Africa.

[94] Ann. Mus. Nat. Hungar., vol. 13, 1915, p. 393.

This fruit pigeon was observed as follows: Tana River, August 14–26, 93 birds in all, some seen every day; Thika River, August 26–27, 6 noted; west of Ithanga Hills, August 28, 4 birds; Juja, Athi River, August 30, 30 seen; Escarpment, September 4, 25 birds.

The female collected on August 20 had been feeding on small fruits (size of a pea) of a large tree (fig ?).

Order CUCULIFORMES

Family MUSOPHAGIDAE

TURACUS LEUCOTIS LEUCOTIS (Rüppell)

Corythaix leucotis Rüppell, N. Wirbelth., Vög., p. 8, pl. 3, 1835: Ethiopia.

Specimens collected:

One male, northwest Kolfale-Arussi, Ethiopia, March 1, 1912 (C. Frick collection).

One male, Cofali, Ethiopia, March 3, 1912.

Two males, Malke, Sidamo River, Ethiopia, March 4, 1912.

One female, probably Malke, Ethiopia, March 4, 1912.

Male and female, Aletta, Ethiopia, March 10, 1912.

Soft parts: Bill and eye wattles, red; feet, plumbeous black; claws, black.

The white-cheeked turaco is one of the two species of its genus entirely restricted to northeastern Africa, the other being *T. ruspolii*, known from only a single specimen. *T. leucotis* has two very distinct races, the typical form found in Eritrea, central Ethiopia, and Shoa; and an eastern race *donaldsoni* found in western Somaliland and eastern Ethiopia from Harrar to the Webi Web and the Webi Shebeli. In the typical form the crest feathers are bluish black distally, while in *donaldsoni* they are reddish terminally. Of the latter subspecies I have seen but a single example; of the former, 11 have been examined. The measurements of these birds are as follows: Male, wing 171–175, tail 183–186.5, culmen from base 23.5–25.0; female, wing 170–177, tail 175–188, culmen from base 22–24 millimeters. Reichenow[95] gives the following measurements: Wing 175–185, tail 200–210, culmen 23–25 millimeters. It will be noted that the data he gives for the tail length are considerably different from those afforded by the series before me. I can not account for the discrepancy, but can only suggest that Reichenow's figures are wrong.

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[95] Vög. Afr., vol. 2, p. 46.

This species lives in thick bush and around the edges of forests, particularly where there are wild figs or other fruit producing trees. Rüppell found it in the taller trees in dense bushy areas. Von Heuglin likewise recorded it in similar places and noted that the birds were to be found in pairs or family groups and that they seemed more or less attached to definite smallish areas. Blanford gives more detailed information about its range. He writes that it—

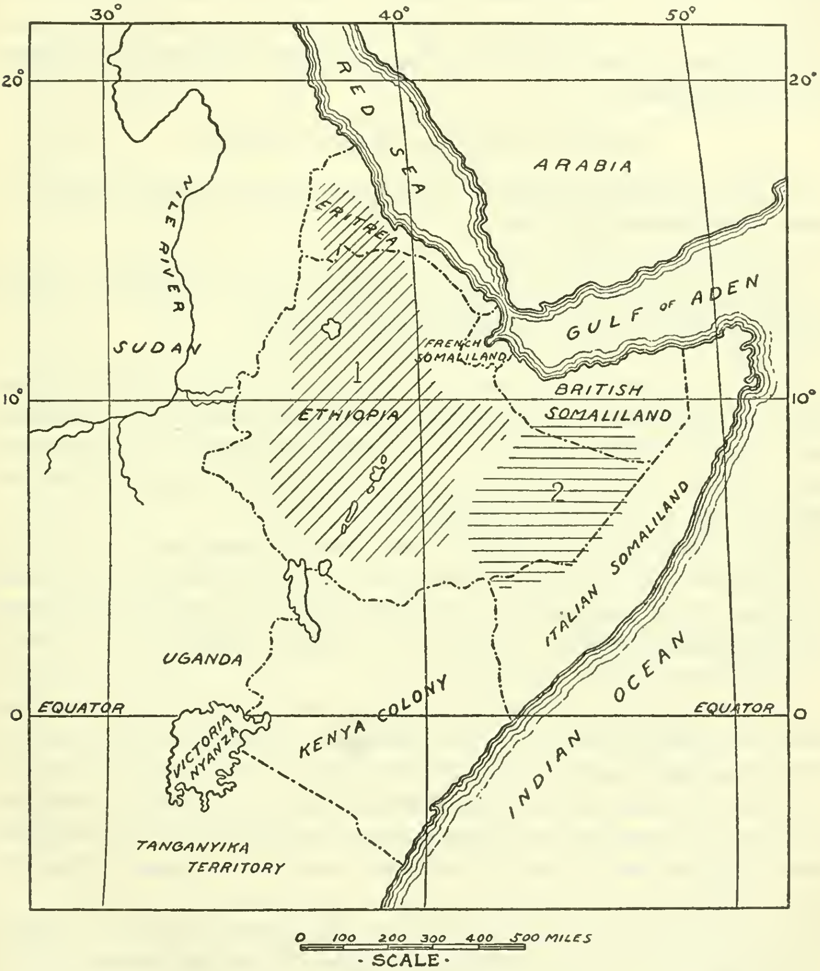

FIGURE 7.—DISTRIBUTION OF TURACUS LEUCOTIS: 1, TURACUS LEUCOTIS LEUCOTIS; 2, TURACUS LEUCOTIS DONALDSONI

> * * * abounds in the subtropical and is often met with in the temperate region up to 8,000 feet * * * never * * * below 4,000 feet. It was common in the passes from Undel Wells nearly to Senafé. It also abounded in the Anseba Valley. It keeps much to high trees, but can climb well and quickly amongst rocks. It is very often seen on junipers—indeed I scarcely ever saw it in the temperate region away from them * * *.

Neumann[96] found *leucotis* common in the Abaya Lakes district, where he searched for the little-known *T. ruspolii*, south almost to Lake Stefanie. Erlanger[97] observed it as Adis Abeba, at Mount Sekuala, and in the lake region of Shoa. Zedlitz[98] records it from a wide area traversing Ethiopia from the Anseba River south to the Omo and Gelo drainage basins and the Gandjule Lakes and Gardula in Shoa.

According to Brehm the breeding season of this turaco in Bogosland is in April.

TURACUS HARTLAUBI (Fischer and Reichenow)

Corythaix hartlaubi Fischer and Reichenow, Journ. f. Ornith., 1884, p. 52: Mount Meru, near Kilimanjaro.

Specimens collected:

Eight males and seven females, Escarpment, 7,390 feet (2,200 meters), Kenya Colony, September 5–10, 1912.

From the first description of this species in 1884 until 1915 the bird was considered as a somewhat variable form, but no attempt was made to divide it into races. In 1915 Mearns[99] assembled a much larger series than anyone had done before him and split the species into four races, as follows:

1. *T. h. hartlaubi.*—Mounts Meru and Kilimanjaro west across Tanganyika Territory and north into Kenya Colony in the Sotik district. This form said to be characterized by having the thighs varying from greenish violet gray to blackish violet gray, the wings and back dark bluish violet.
2. *T. h. medius.*—Forested highlands, north of the Uganda Railway from Machakos to Victoria Nyanza. Similar to *hartlaubi*, but with the wings and back helvetia blue instead of dark bluish violet.
3. *T. h. caerulescens.*—The forested summit of Mount Gargues. Similar to *medius*, but with the red portion of the wing quills redder, less purplish above; the throat and breast calla green instead of cerro green.
4. *T. h. crissalis.*—The forested summit of Mount Mbololo. Differs from all other forms in having the thighs black, not violet gray.

The next worker to assemble a good series of specimens was Van Someren,[1] who found that *crissalis* could not be upheld as the coloration of the vent and thighs varies greatly in birds from any one locality. Van Someren writes that, "* * * in the Machakos,

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[96] Journ. f. Ornith., 1904, p. 379.

[97] Idem, 1905, p. 436.

[98] Idem, 1910, p. 746.

[99] Smiths. Misc. Colls., vol. 65, no. 13, pp. 1–4.

[1] Nov. Zool., vol. 29, 1922, pp. 48–49.

Kenya, Nairobi, and Escarpment districts there may possibly be a recognizable subspecies which would have to bear the name of *T. h. medius* * * * *T. h. caeruleus* * * * from Mount Uraguess may possibly be separable, because the avifauna from that district is most remarkable." In other words, Van Someren was unable to definitely corroborate any of Mearns' races and was able to show that one of them was clearly untenable. Sclater [2] writes that the three new forms named by Mearns, "* * * require further investigation before they can be recognized as valid." In 1928 [3] I noted that the three could not be distinguished in a series of 45 adults from various parts of Kenya Colony and Tanganyika Territory.

In studying the variations and systematics of this species I have carefully examined a large series (108 adults) including the types of *medius*, *crissalis*, and *caerulescens*, and practically topotypical specimens of *hartlaubi*. The localities represented in the series are as follows: Tanganyika Territory—Mount Kilimanjaro, Usambara Mountains; Kenya Colony—Chuka, Nyeri, Embu, 10 miles from Gilgil, Ngong, Nairobi, Morijo, Morroshura, Escarpment, Mount Gargues (equal Mount Uraguess of Van Someren), Mount Mbololo, and Mount Kenia. I find that none of the characters of any of the races holds good, that *hartlaubi* is a variable species but that the variations have no geographical significance. Of all the so-called forms, *medius* seems the best characterized by being very slightly less violaceous, more bluish, than typical *hartlaubi*, but the difference, very slight at best, is only an extremely small average one requiring large series for its exhibition. If it were to be recognized about four-fifths of the birds from its so-called range would have to be identified as intermediate between it and *hartlaubi*.

Turacus hartlaubi is a bird of the highland forests of Kenya Colony, ranging south into northern Tanganyika Territory where it extends to the Usambara Mountains, but does not reach the Uluguru range. Its ecological requirements are not merely those of a dense forest, as it does not occur in lowland forests. On Mount Kilimanjaro, for example, it occurs in the wooded zone from about 4,000 feet to 10,000 feet, but in the near-by forest at Taveta (2,300 feet) it certainly does not occur, as I spent some two months there in 1925 and did not see it. Likewise Abbott did not meet with it at Taveta. The species is definitely known from the following localities:

Tanganyika Territory.—Mount Meru, Mount Kilimanjaro, Marangu, Great Arusha, Mori River, Usambara Mountains (Bumbuli, Phillipshof, and Lushoto), and Sagayo.

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[2] Syst. Avium Ethiop., 1924, p. 193.

[3] Ibis, pp. 78–79.

Kenya Colony.—Nairobi, Ngong, Kyambu, Kikuyu, Chuka, Embu, Nyeri, Gilgil, Mount Kenia, Machakos, Morroshura, Mau, Molo, Ssubugo Forest, Fort Smith, Escarpment, Eldoma Ravine, Burnt Forest, Elgeyu, Londiani, Sotik Forest, Mount Mbololo, Mount Uraguess, and Mount Elgon.

The large series of birds examined indicates no sexual differences either in color or in size. The variations in size are as follows: Wing, 153–180; tail, 179–203; culmen from base, 21–25 millimeters. The average measurements are: Wing 170, tail 189, and culmen 23 millimeters.

A juvenal bird, not more than a few days out of the nest (if not actually taken from the nest), collected on December 20, 1926, at Lushoto, Usambara Mountains, is interesting. It is dorsally covered with dark blackish down except on the wings, tail, and lateral interscapulars which have pennaceous, juvenal feathers, dark blue in color, becoming blacker on the remiges and rectrices. The down of the underparts is dark brownish or brownish fuscous, lightest and least fuscous on the throat and chin; darkest on the breast and anterior part of the abdomen and on the sides and flanks. The point of greatest interest, however, is the distribution of the red color in the remiges. This has been described before[4] but may be briefly repeated. In adult birds the red color occurs in all but the outermost (first pair of) primaries and the innermost secondaries, and extends nearly to the tips of the feathers. In the young bird it occurs only in primaries three to nine inclusive (counting from the outside) and is basal in distribution, not extending half way to the tips of the feathers. It is also more orange, less bright reddish than in adult birds.

Lönnberg[5] describes fully fledged young birds as being less glossy than the adult, with the white on the head less developed, and with greenish margins to the blue feathers of the upper parts. "The red of the wing is confined to the basal half of the primaries, the secondaries being bluish black all over. The red color of the wing is also different in the young bird, being more scarlet than crimson." Oberholser[6] similarly describes a young *T. hartlaubi.*

Judging by the plumage variations and stages of molts shown by the series examined, it appears that in the postjuvenal molt the secondaries are replaced but the juvenal primaries are retained, thereby affording a means of identifying year-old birds (immature) from those two years or more in age (adults). Superficially the immature birds look like adults, and the only character that serves to identify them is the very broad terminal brownish-blue-black area on the primaries. It must be admitted, however, that observations on the molt of living young birds are needed to corroborate all this. If it is eventually shown to be true (as it seems to be from an examination of skins), it would constitute a very peculiar type of incomplete postjuvenal molt, extending from the body down the radio-ulnar part of the alar tract and not affecting the manus.

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[4] Friedmann, Ibis, 1928, p. 79.

[5] Kungl. Sv. Vet. Akad. Handlgr., vol. 47, no. 5, 1911, pp. 62–63.

[6] Proc. U. S. Nat. Mus., vol. 28, 1905, p. 849.

CRINIFER ZONURUS (Rüppell)

Chizaerhis zonurus RÜPPELL, N. Wirbelth., Vög., p. 9, pl. 4, 1835: Temben Province, Ethiopia.

Specimens collected:

Male, Hawash River, Ethiopia, February 11, 1912.

The Abyssinian gray plantain eater occurs from Bogosland, Eritrea, Sennar, and Ethiopia, south to the Bahr el Ghazal, Uganda, western Kenya Colony (Kavirondo and Kisii), northwestern Tanganyika Territory (Kome, Mwanza, Kageyi, and Bukoba), and the adjacent areas of Ruanda and Urundi to the northern end of Lake Tanganyika (Luvungi). Sclater[7] gives only a very incomplete statement of its range, not recording it south of Uganda in spite of numerous records published prior to 1924.[8]

In the whole of its range it is local and therefore seems relatively uncommon in collections. Thus, Von Heuglin found it in pairs or small groups in thickly wooded gorges. Rüppell found it always near streams bordered by high trees. Neumann met with it but once on his expedition through Shoa and southern Ethiopia, at Godjeb Valley between Kaffa and Djimma, while Erlanger never saw it at all. Neumann[9] corrected one important matter with regard to Reichenow's statement of the range of this species when he showed that the record from Sheikh, Somaliland, did not apply to *zonurus* but to *Corythaixoides leucogaster*. *Crinifer zonurus* does not occur in the whole of Somaliland as far as known. However, Neumann wrote that it was also absent from the Hawash district, Ethiopia, a statement that is hard to reconcile with the specimen collected on the Hawash River by Mearns. It seems that the species is absent in the eastern part of the Hawash basin, but its exact distributional limits are not known. Zedlitz[10] recorded it from Anseba east of Cheren, and from Ela Bered, and said that it occurred in the Eritrean inland highland district, not on the coastal lowlands except in the river valleys. According to Zedlitz the distribution of the bird is the same as the area which usually receives winter rains, which, in turn produce luxuriant vegetation in February and March when the birds breed. Schrader and Beccari collected this plantain eater at several localities in Eritrea (Ali Beret, Arba Schiko, Ghadi Saati, Mareb, Torah, and Gurareba). To sum up all the above data, it appears that *Crinifer zonurus* occurs in the parts of Eritrea and Ethiopia that drain into the Nile system and extends eastward only slightly into the Hawash basin. Southward, its range extends along the Nile Valley through Uganda (east to Kavirondo, Kenya Colony) south to northwestern Tanganyika Territory (Mwanza, Bukoba, etc.), Ruanda, Urundi, and to the north end of Lake Tanganyika.

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[7] Syst. Avium Ethiop., 1924, p. 195.

[8] See Reichenow, Thierwelt Ost-Afrikas, vol. 2, Vögel, 1895, pp. 101–102: Bukoba and Kageyi, Tanganyika Territory; Neumann, Nov. Zool., vol. 15, 1908, p. 367: Kavirondo and Lake Victoria; Sassi, Ann. K. K. Naturhist. Hofmus., vol. 26, 1912, p. 375; Urundi, etc.

[9] Journ. f. Ornith., 1904, p. 378.

[10] Idem, 1910, pp. 739–740.

This species varies greatly in size as the following figures show:

Locality	Sex	Wing	Tail	Culmen
Ethiopia, Hawash River	♂	257	261	29. 0
Belgian Congo, Luvungi	♂	262	271	30. 5
Uganda, Kampala	♂	259	260	29. 5
Kenya Colony, Kisii	♂	247	255	30. 0
Tanganyika Territory:				
Kome, Mwanza	♂	267	258	29. 5
Do	♂	252	270	29. 5
Do	♀	252	264	32. 0
Ukerewe	------	251	253	27. 0

Sclater[7] considers *zonurus* as specifically distinct from west African *piscator*, although the former is obviously a geographical representative of the latter. It is, however, unusually well marked, but the specimen from Ukerewe listed above is more or less intermediate, having the entire underparts streaked as in *piscator* but the streaks very much lighter. The tail character, however, holds good, being broadly banded with whitish in *zonurus* and not banded in *piscator*, and it appears that the two may be considered species.

Grote[11] has recently described a new form of *piscator* from the eastern part of Neu Kamerun—*obscuratus*, said to be darker above, especially on the nape, than typical *piscator*. I have seen no *obscuratus* unless two birds from Sakbayeme, Cameroon, be referred to that race. Grote compared his *obscuratus* with specimens of *piscator* from Togoland and found the differences which he used as the basis of his description. The two Sakbayeme birds are quite indistinguishable from one from Togoland in the Museum of Comparative Zoölogy. They are very slightly darker above, but this seems to be due wholly to the way the skins are made. Of course, it is not improbable that *obscuratus* is confined to northeastern Cameroon and that Sakbayeme birds are true *piscator*. If not, *obscuratus* is doubtfully distinct.

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[7] Syst. Avium Ethiop., 1924, p. 195.

[11] Orn. Monatsb., vol. 31, 1923, p. 63.

CORYTHAIXOIDES LEUCOGASTER (Rüppell)

Chizaerhis leucogaster RÜPPELL, Mus. Senck., vol. 3, p. 27, 1842, South Ethiopia.

Specimens collected:

Male, Ourso, Ethiopia, September 13, 1911 (A. Ouellard collection).

Male and female, Ourso, Ethiopia, October 12, 1911 (A. Ouellard collection).

Male, Tollo, Ethiopia, December 15, 1911.

Male, Moulu, Ethiopia, December 17, 1911.

Two males and one female, Dire Daoua, Ethiopia, December 17–21, 1911 (Von Zülow collection).

Female, Duletcha, Ethiopia, January 24, 1912.

Two males, Sadi Malka, Ethiopia, February 3, 1912.

Male and female, Hawash River, Ethiopia February 10–12, 1912.

One male and two females, Black Lake Abaya, Ethiopia, March 19–26, 1912.

Three males and 2 females, Gato River near Gardula, Ethiopia, March 31 to May 2, 1912.

Four females, Sagon River, Ethiopia, June 3–4, 1912.

Male and female, Mar Mora, Ethiopia, June 7–14, 1912.

Male, Tertale, Ethiopia, June 10, 1912.

Male and female, Endoto Mountains, south, Kenya Colony, July 24, 1912.

Male, 24 miles south of Malele, Kenya Colony, July 29, 1912.

Male, Tana River, 1,200 feet (360 meters), Kenya Colony, August 14, 1912.

Female, Tana River, camp 6, Kenya Colony, August 22, 1912.

Soft parts; male: Iris, hazel; bill and feet, blackish; claws, black. Female: Iris, brown to grayish brown; feet, brownish black to blackish; claws, black; bill, yellowish green in adult, blackish in young birds.

In studying this species I have examined a series of 58 birds (34 males, 24 females) distributed as follows: Ethiopia, 15 males and 13 females; British Somaliland 2 males and 1 female; Kenya Colony, 18 males and 10 females; Tanganyika Territory 1 male and 1 female.

Neumann[12] writes that he can find no difference between Abyssinian specimens and examples from East Africa. Van Someren[13] on the other hand, finds that specimens from Kenya Colony are, on the whole, smaller than Ethiopian ones, having wing lengths of 205 to 220, as against 215 to 230 millimeters, but that otherwise there appears to be no difference. I have measured all the individuals in the series available and find the following variation in wing length:

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[12] Journ. f. Ornith., 1904, p. 378.

[13] Nov. Zool., vol. 29, 1922, p. 49.

Males: Ethiopia and British Somaliland, 207–241 (average 223.2); Kenya Colony and Tanganyika Territory 195–231 millimeters (average 214.0).

Females: Ethiopia and British Somaliland 211–234 (average 219.4); Kenya Colony and Tanganyika Territory 205–225 millimeters (average 213.9).

While the extremes are fairly similar it is true that on the whole the northern male birds are larger, that is, most of them have wing lengths of over 220 millimeters, while the majority of the southern males have them less than 220 millimeters. In the females there is no difference. It seems that the variation is so great and the overlapping so extensive that it is unwise to attempt subspecific discrimination. If the southern birds were to be considered separable they would have to be known as *C. leucogaster pallidirostris*.[14] This name was applied to the birds with yellowish-green bills before the sexual nature of this character was discovered. Neumann[15] records a female with a black bill, but writes that it may be a young bird. Mearns corroborates this with his notes on the soft parts, as has already been shown.

The range of the white-bellied goaway bird is as follows: Shoa and the Hawash region, and all of Somaliland south through Kenya Colony to central Tanganyika Territory (Usagara and Ugogo) west to Tarangole in the north and to the Rift Valley in Kenya Colony and northern Tanganyika Territory. It seems to be locally absent in the coastal districts from the Pangani River north to Witu, according to Reichenow.[16] However, Sjöstedt[17] writes that it was common in several places in Usambara, although met with but once on Mount Meru. Inasmuch as the Usambara Mountains are close to the coast near the Pangani River, it may well be that Reichenow's statement merely means that no actual specimens had been recorded from north of that river. The species inhabits the Acacia-Mimosa thorn country of eastern Africa, and is somewhat local, being numerous in places, scarce, or even absent in others apparently equally suitable.

On April 18 at Gato River, near Gardula, Ethiopia, Mearns found and collected a female bird (U.S.N.M. 244221) sitting on a nest with two eggs which were about ready to hatch. The eggs were immaculate, pale bluish; size, 42 by 34, 43 by 33 millimeters.

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[14] Cabanis, Journ. f. Ornith., 1878, p. 237; interior of Ukamba, Kenya Colony.

[15] Nov. Zool., vol. 15, 1908, pp. 367–368.

[16] Thierwelt Ost-Afr., vol. 2, Vögel, 1895, p. 102.

[17] Kilimanjaro-Meru Exp., vol. 1, Vögel, 1910, p. 82.

The nest was a mere lattice of sticks near the end of a horizontal bough of a large thorn tree; nest about 35 feet above the ground. "When the female was seen sitting it was hard to see any nest at all, the structure being so slight." When the feathers begin to grow they are wholly encased in sheaths as in cuckoos and kingfishers. To judge from Mearns' fragmentary notes, the trichoptiles are present at the time of hatching.

Erlanger[18] found the birds breeding during February, March, and April in northern Somaliland, and collected a young bird about eight days old as late as May 27. He also found two eggs to be the clutch, and to be pale grayish green in color. The nest, built of twigs and thorns, resembles a large dove's nest and is so loosely constructed that an observer can look through it and see if it contains eggs or young. The nest is usually placed high up in the crown of a tall acacia tree.

A female collected at the Tana River, Kenya Colony, August 22, had its stomach filled with green vegetation finely comminuted, "* * * like the stomach contents of a *Spermophilus*."

This species was recorded as follows: Gidabo River, March 15–17, 2 seen; Abaya Lakes, March 18–26, 90; near Gardula, March 26–29, 20 birds; Gato River, March 29 to May 17, 300; Bodessa and Sagon River, May 18 to June 6, 645; Tertale, June 7–12, 220 noted; El Ade, June 12–14, 55; Mar Mora, June 15, 20 seen; Turturo, June 15–17, 30 birds; Anole, June 17, 20; Wobok, June 18, 30; near Saru, June 19, 30; Yebo, June 20, 25 seen; Karsa Barecha, June 21, 30 birds; Chaffa villages, June 22–23, 30 seen; Malele and southward for 45 miles, July 28–30, 60; Northern Guaso Nyiro River, July 31 to August 3, 20; Tharaka district, August 12–13, 8 seen; Tana River, August 14–23, 55; Tana River at mouth of Thika River, August 23–26, 36 birds; Thika River, August 26–27, 35 seen; west of Ithanga Hills, August 28, 25 birds noted.

Roberts[19] has created a genus, *Criniferoides*, for *leucogaster*, which seems fairly well defined and not unnatural. It may be that its adoption would be useful, although I personally have little faith in the "naturalness" of most genera and therefore refrain from adding to their number.

GYMNOSCHIZORHIS PERSONATA (Rüppell)

Chizaerhis personata RÜPPELL, Proc. Zool. Soc. Lond. for 1842, p. 8, June 1842: Ethiopia.

Specimens collected:

Male, Duletcha, Ethiopia, January 24, 1912.
Female, Lake Zwai, Ethiopia, March 3, 1912.
Male and female, Gato River near Gardula, April 26, 1912.

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[18] Journ. f. Ornith., 1905, pp. 433–434.

[19] Ann. Transv. Mus., vol. 11, 1926, p. 218.

Soft parts: Naked areas of face and throat, the bill and feet, slate black.

This species is so very distinct from *leopoldi* that it seems correct to consider them as distinct specific entities, and not as races of one form. The present bird has the underside of the tail, and, to a lesser extent, of the wings, greenish, while *leopoldi* has these areas gray. The green color on the breast is more broadly suffused over the pectoral area in *personata*, more medially concentrated in *leopoldi*, and the color of the abdomen is darker in the former than in the latter.

Sclater[20] calls *personata* the brown-faced and *leopoldi* the black-faced goaway bird. Mearns noted the color of the naked facial areas as slate black, a statement that seems to contradict Sclater's nomenclature. However, all of the specimens have this bare region sparsely covered with minute brownish feathers, which give it a brownish look when compared with *leopoldi.*

Unfortunately I have been able to compare these four specimens with but one other, so the total series is small. The measurements are as follows:

Male: Wing 220, tail 264, culmen from base 27 millimeters.
Male: Wing 224, tail 293, culmen from base 24.5 millimeters.
Female: Wing 218, tail 278, culmen from base 23.5 millimeters.
Female: Wing 214, tail 241, culmen from base 25.5 millimeters.
Female: Wing 214.5, tail 265, culmen from base 23.5 millimeters.

Small as the series is, it indicates that males are larger than females on the average, and that the measurements given by Reichenow[21] are too small (wing 210–215, tail 260–275, culmen 26 millimeters).

The two birds from Gato River appear to be the southernmost records for the species. Neumann[22] gives Lake Zwai as the southern limit of its range, and I know of no other records south of that point. The extension of range involved amounts to approximately 150 miles. The distribution of this plantain eater is still none too thoroughly understood, but it may be summarized as follows: Central Ethiopia and the Hawash region south to the Shoan Lake district, probably to Lakes Stefanie and Rudolf. It does not occur in the Nile drainage basin as far as known. It is ecologically restricted to the thicker Acacia-Mimosa thornbush country, where it occurs in small parties and keeps high up in the tallest trees. Erlanger[23] writes that in choice of habitat it greatly resembles *Corythaixoides leucogaster.* The same worker also found a nest with two young near Harrar (Erer Valley) on April 30. Mearns noted that the male and female he collected near Gardula on April 26 were a mated pair, a bit of indirect evidence, which, taken together with the data presented by Erlanger, indicates the breeding season to be more or less the same throughout most of the range of the species.

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[20] Syst. Avium Ethiop., 1924, p. 196.

[21] Vögel Afr., vol. 2, 1903, p. 37.

[22] Nov. Zool., vol. 15, 1908, p. 368.

[23] Journ. f. Ornith., 1905, p. 433.

Family CUCULIDAE

CUCULUS CANORUS Linnaeus subspecies

Cuculus canorus Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 110, 1758: Europe.

Specimens collected:

Female, immature, Gato River near Gardula, Ethiopia, April 17, 1912.

This bird is in immature plumage and is therefore impossible to identify beyond the species. Three races are known to occur in southern Ethiopia, and it may be any one of them. These three are a resident form, *gularis*, and two migrants from the north, *canorus* and *telephonus*. Inasmuch as the immature plumage is known to be very variable, there is little to be gained by attempting a guess between the three. Still, the following points may be worth noting:

Roberts[24] describes an immature *Cuculus* from Maputa River, southern Mozambique, probably referable to *gularis*, as having the bill almost entirely yellow, with only the tip brown. The present specimen has the whole bill brown, and is therefore probably not *gularis*. However, it differs from a series of immature *canorus* and *telephonus* in having no trace of rufous in the plumage, agreeing in this respect with Roberts' bird (*gularis?*). Its measurements are as follows: Wing, 194; tail, 158; culmen, 18 millimeters.

Meinertzhagen[25] has discussed the migrations in Africa of *canorus* and *telephonus* and finds that all Egyptian migrants are *canorus*, while all Palestine birds (5) and three out of four birds collected in Kenya Colony are *telephonus*. It seems as though *telephonus* enters Africa in the region south of the Red Sea (about Cape Gardafui). It is definitely known from northern Somaliland, southern Anglo-Egyptian Sudan (Fashoda, subspecies identified by Hartert, not definitely accepted by Sclater and Praed),[26] Ethiopia, Kenya Colony, Uganda, eastern Belgian Congo, and the Zambesi Valley. It is much rarer in the African continent than is typical *canorus*, and, on the law of probability, the specimen collected by Mearns should be of the European race.

The migration dates in Ethiopia and Kenya Colony are not well worked out but European *canorus* have been found in northern

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[24] Ann. Transvaal Mus., vol. 10, 1924, pp. 80–81.

[25] Ibis, 1922, p. 52.

[26] Idem, 1920, p. 643.

Somaliland from late in August until the middle of September; in the Sudan, during September. However, Meinertzhagen[25] collected one as early as July 29 in Uganda, and another at Korogwe, Tanganyika Territory, on August 26, but according to him they do not arrive in tropical eastern Africa in any numbers until October. In the Kenya-Tanganyika-Uganda region the birds are found all winter, but in the Sudan, Ethiopia, and Somaliland they appear to occur only on migration. The birds leave tropical east Africa in March although a few stragglers linger until nearly the end of April. In the Sudan the birds pass through in numbers during the latter half of April and early May. In Egypt they arrive from the south in the second week of April and the last individuals have gone through by the middle of May.

The Asiatic race *telephonus* seems to precede the European form a little in the northward spring migration and to lag behind it in migration time. The difference is slight—only a week or 10 days as far as can be determined from present knowledge.

"The bird collected was chased out of a big tree in a clearing by a drongo." (E. A. Mearns.)

CUCULUS SOLITARIUS Stephens

Cuculus solitarius Stephens, in Shaw's Genl. Zool., vol. 9, p. 84, pl. 18, 1815: Caffraria—Eastern Cape Province (ex Levaillant).

Specimens collected:

Two males, Botola, Sidamo, Ethiopia, March 4, 1912.
Three males and one female, Aletta, Ethiopia, March 7–11, 1912.

Soft parts: Eye ring, feet, and claws yellow; bill blackish, the basal two-thirds olive; corners of mouth orange.

These six specimens (the only ones from northeastern Africa examined) are darker and redder on the breast than 22 others from South Africa, Tanganyika Territory, Kenya Colony, Uganda, and the Belgian Congo. They also differ from the latter series in being slightly darker on the upper parts as well but this difference is not constant. It seems that the Ethiopian birds may be racially distinct from those of the rest of Africa, but they can not be given a name until the following nomenclatural tangle is straightened out. *Cuculus heuglini*[27] was based on a bird from Bahr el Abiad and is generally considered a synonym of *C. solitarius*. In 1856 Heuglin[28] used the name *C. ruficollis* for a bird from Bahr el Abiad and considered the now current *C. solitarius* as a synonym. It therefore follows that *heuglini* can be nothing but a pure synonym of *ruficollis*. However, *ruficollis* is said to be a synonym of *gularis*, based on an immature specimen with a rufous throat. Yet the same authors that list *heuglini* as a synonym of *solitarius* consider *ruficollis* as one of *gularis*.[29] If *heuglini* and *ruficollis* are really based on specimens of *solitarius*, it would be necessary to examine birds from the Bahr el Abiad (White Nile) before describing as new the Ethiopian form, as they may be identical, in which case the name *ruficollis* Heuglin would have to be used.

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[25] Ibis, 1922, p. 52.

[27] Cabanis and Heine, Mus. Hein., vol. 4, Heft 1, 1862, p. 42 (not p. 32 as given in the Cat. Birds Brit. Mus., Vögel Afr., etc.).

[28] Sitzb. Ak. Wiss. Wien, p. 300.

Yet another possibility presents itself. One specimen from Natal, South Africa, and one from the Usambara Mountains, Tanganyika Territory, approach the Abyssinian birds in color, almost matching them. It may be that a larger series from northeastern Africa would show the difference to be less real than it appears, but still the present series is so constantly dark that this seems unlikely. It may be, in fact, it seems not unlikely, that the birds of the mountain forests in tropical eastern Africa, such as the Uluguru and the Usambara ranges, may average darker than birds of lowland forests or comparatively lowland woods, such as Taveta, Ngong, etc.

Whether or not the Ethiopian birds be regarded as subspecifically distinct, it is of interest to find that the species tends to darkness in color in that part of its range. There are four closely allied forms of *Cuculus* in Africa, *solitarius*, *clamosus*, *gabonensis*, and *chalybeus*, which vary in an interesting manner. *C. chalybeus* combines to some extent the characters of *clamosus* and *gabonensis;* likewise *mabirae*, a race of *gabonensis*, blends the color characters of that species with those of *solitarius*. The Abyssinian examples of the latter feebly suggest (but only very slightly) an approach toward *gabonensis* in general intensity of coloration, although retaining the gray throat (which is rufous in *gabonensis*).

The juvenal plumage of *solitarius* is quite distinct from that of *clamosus*, *chalybeus*, and *gabonensis*. It has the entire head, back, tail, wings, chin, throat, and breast blackish, the feathers narrowly tipped with white, the rectrices with large white irregular spots, usually more or less median in position, the remiges incompletely and irregularly barred with white on the inner webs; a white patch on the occiput; the abdomen and under-tail coverts white heavily and broadly banded with black, the bands being less heavy and broken into transverse spots on the under-tail coverts. A specimen in postjuvenal molt indicates that the first feathers to be shed and replaced are those of the abdomen and under-tail coverts, then the interscapulars, lower back and upper tail coverts, then the breast, beginning posteriorly and proceeding forward, while the head and hind neck appear to be the last to molt. The wings and tail are shed in the postjuvenal molt but are retained throughout the first "winter" or its ecological equivalent. Apparently the immature plumage resembles that of the adult, except for the fact that in the former the rufous breast is lighter and is barred with blackish. Judging by the fact that birds in this plumage have either worn juvenal remiges and rectrices or new ones more brownish, less bluish black than those of the adults, it appears that the first "winter" plumage is followed by a complete molt, which ushers in an immature breeding plumage which differs only in the wings and tail. The adult plumage, which is characterized by unbarred rufous breast and bluer, less brownish wings, apparently is not acquired until the third year. However, the birds breed in the second year, as many birds with barred breasts have been collected and found to be in breeding condition.

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[29] See Reichenow, Vög. Afr., vol. 2, pp. 87 and 91; Cat. Bds. Brit. Mus., vol. 19, 1891, pp. 244 and 258; etc.

Bannerman[30] has studied the plumage changes in this cuckoo and records conclusions somewhat different from those presented above. His "first stage" is the same as what is here called the juvenal plumage, but his "second stage," which is like the first except in that the white tips to the feathers are less conspicuous, and that the abdomen and under-tail coverts are more whitish, less buffy, and that the rectrices have four white spots, seems to me but a worn juvenal bird molting into immature plumage, especially in the tail. His "third stage" appears to be the same as the first or immature "winter" plumage. Suffice it to say that *Cuculus solitarius* can always be identified as follows: Except in juvenal plumage it may always be told from specimens of *clamosus*, *gabonensis*, and *chalybeus* by the presence of four white spots in the webs of the central pair of rectrices, which the latter three do not have. In juvenal plumage it may be told by the fact that the abdomen and under-tail coverts are whitish or buffy banded with black, while in *clamosus*, *gabonensis*, and *chalybeus* these parts are black throughout like the rest of the body.

Mearns noted this cuckoo at the following places: Aletta, March 7–13, 100 seen; Loco, March 13–15, 10 birds; Gidabo River, March 15–17, 10 noted; Lake Abaya, March 18, 4 seen; Gato River, March 29 to May 17, 20 noted. The record of 100 birds in two days at Aletto suggests a migratory movement in the northern part of the range of this bird comparable to that in South Africa.

CUCULUS CLAMOSUS CLAMOSUS Latham

Cuculus clamosus LATHAM, Genl. Syn., vol. 2, Suppl., p. 30, 1802: Cape of Good Hope.

Specimens collected:

Male, Gato River near Gardula, Ethiopia, April 12, 1912.

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[30] Ibis, 1921, pp. 89–91.

Soft parts: Iris dark brown; bare space around eye slate color; bill uniform slaty black; feet pale brownish gray anteriorly, flesh color posteriorly; claws black.

This specimen was shot together with a male of *Cuculus clamosus chalybeus*.

The black cuckoo reaches its northern limit in northern Ethiopia and Eritrea but seems to be rather uncommon there. Thus, Erlanger[31] found it but once—near Bakora (on the route between Harrar and Adis Abeba), Hawash region; Neumann[32] also procured but a single specimen at Schenna, west Kaffa area (see under next subspecies); Antinori secured one at Sciotalit[33]; and Lefebvre obtained this bird in northern Tigre district. Von Heuglin's records from Gin and from the Anseba Valley refer to *chalybeus*. Blanford, however, did not see it in the last-named region, so it can not have been numerous.

In spite of all these northern records the range of the species as given by Sclater[34] stops in a northern direction with southern Ethiopia. This is probably based on Bannerman's[35] list of the specimens examined by him in the British Museum, the Tring Museum, and the collections of Sir Frederick Jackson and of Doctor van Someren.

Heuglin[36] notes that Lefevre records *clamosus* from Schirre.

The black cuckoo is not definitely known to breed anywhere in the northern part of its range (Ethiopia, Eritrea, Sudan, Uganda, Kenya Colony, and Belgian Congo), and is known in the southern part of its range only in the southern summer, October to March. In Kenya Colony, Ethiopia, and the Sudan specimens have been taken only from March to September. The breeding birds of Ethiopia, Kenya, Uganda, and the Congo are the form known as *chalybeus*. The two forms have been kept as distinct species by most workers,[37] the northern one under the name *jacksoni* Sharpe, but are obviously geographical representatives of one specific entity.

CUCULUS CLAMOSUS CHALYBEUS Heuglin

Cuculus chalybeus HEUGLIN, Journ. f. Ornith., 1862, p. 34: Ain Saba Ethiopia.

Specimens collected:

Five males and one female, Gato River near Gardula, Ethiopia, March 27 to April 28, 1912.

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[31] Journ. f. Ornith., 1905, p. 482.

[32] Idem, 1904, p. 381.

[33] Salvadori, Ann. Mus. Civ. Genova, vol. 21, 1884, p. 94.

[34] Syst. Avium Ethiop., 1924, p. 180.

[35] Ibis, 1921, p. 98.

[36] Journ. f. Ornith., 1862, p. 35.

[37] See Sclater and Praed, Ibis, 1919, pp. 643–644; Bannerman, idem, 1921, pp. 91–94; Syst. Avium Ethiop., 1924, p. 180, etc.

Soft parts: Iris dark brown; bare space around eye slate color; bill uniform slaty black; feet pale brownish gray anteriorly, flesh color posteriorly; claws black.

This race, which has been usually called by Sharpe's name *jacksoni*,[38] has been definitely recorded from Ethiopia but three times, not counting the present series. Heuglin[39] described a bird from Ain Saba as a new species, *chalybeus*, similar to *clamosus* but, "* * * *his, pectore ventreque ferrugineo lineatis* * * * *intus, basin versus maculis transversalibus albis notatis* * * *." This description obviously refers to the bird currently known as *jacksoni*, but was early relegated to the synonymy of *clamosus* and not revived even when *jacksoni* was found to occur in southern Ethiopia. Neumann[40] procured a subadult male at Schenna, west Kaffa district, which he referred to *clamosus*, but noted that it had a reddish-brown throat spot. This bird seems to have been more probably an unusual variant of *chalybeus.* In fact, Neumann suggested that northeastern *clamosus* might prove to be separable from the typical southern birds and be somewhat intermediate between them and *gabonensis*, in which case Von Heuglin's name would be available for them. Besides these two records, this bird was known from the Charada forest, southern Ethiopia, and now from near Gardula as well.

The probable reason why *chalybeus* was so long hidden in the synonymy of *clamosus*, and *jacksoni* accepted, is that typical *clamosus* is found all over eastern Africa side by side with the other. Therefore the two were considered as species, and inasmuch as the plumage sequences of neither were known and Heuglin's bird was apparently subadult it was considered as an obscure plumage incapable of positive identification. Summation of our knowledge of these cuckoos shows definitely that typical *clamosus* breeds in South Africa, where is occurs from October to March, and is unknown elsewhere except from March to October, when no birds in breeding condition have been found. In other words, although it is possible to find both forms together in East Africa and Ethiopia, the *clamosus* individuals are always "wintering" migrants from the south, whereas the *chalybeus* are resident, breeding birds. Also as the plumages of the immature birds became somewhat known it was found that *clamosus* never has any rufous on the throat. It therefore follows that Von Heuglin's bird was not *clamosus*, and his name must stand and *jacksoni* become a synonym of it.

Cuculus clamosus chalybeus has a rather curiously discontinuous distribution, which may be accounted for more by ecology than by geography. It is very much more of a forest bird than is the typical form, and the distribution of forest is exceedingly patchy and broken in northeastern and eastern tropical Africa. This cuckoo has been found in southern Ethiopia (in the four localities mentioned above), in the Bahr-el-Ghazal region of the Sudan, in Uganda, and in two localities in Kenya Colony, the slopes of Mount Kenia, and the Kakamega-Kaimosi forest between Mount Elgon and Kavirondo Gulf.

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[38] Bull. Brit. Orn. Cl., vol. 13, 1902, p. 7; Toro, Uganda.

[39] Journ. f. Ornith., 1862, p. 34.

[40] Idem, 1904, p. 381.

The juvenal and immature plumages of this bird and the closely related *clamosus* are not yet thoroughly understood, and undoubtedly much that is puzzling in the distribution of *clamosus* in its winter range will depend for its solution upon a careful study of the molts of these forms. The work, however, must be done in the field, not in the museum. In his valuable notes on these birds Bannerman[41] writes that the problem of identifying subadult birds is rendered almost hopeless, since "* * * unfortunately both forms occur side by side in many districts—even in the same forests." While in general this is true (one of the birds collected by Mearns was shot together with a migrant *clamosus*), it seems that more frequently it would be found that the two did not occur, "* * * even in the same forests." In my own field experience with these cuckoos I always found *clamosus* in thornbush country, in Acacia-Mimosa thickets and savannas, while *chalybeus* was met with only in forests. I think that in the absence of field studies, if museum workers having ample material would put all forest specimens on one side and birds from savannas and bushveldt on the other, they might be able to work out the plumage changes of each. The migrant *clamosus* could be distinguished in many cases by dates and by the degree of abrasion of the feathers. Of course, it is not to be expected that *chalybeus* never gets out of the forest or that *clamosus* never penetrates wooded areas, but all such doubtful specimens could be ignored in such a study. The present form is obviously a northern race of *clamosus*, being the forest-inhabiting aggregate of the species.

I have not the material on which to base a survey of the plumages and molts of the races of this cuckoo, but for the benefit of anyone who has and cares to make the study I append the following facts:

An immature female *chalybeus* from the eastern Belgian Congo, now in the Museum of Comparative Zoölogy, is entirely dark fuscous brown, but is molting into immature plumage on the underparts. The new feathers on the breast and abdomen are dark fuscous narrowly barred transversely with rufous and dull buffy. This specimen agrees with another recorded by Bannerman,[41] and indicates that the juvenal plumage is probably wholly dark fuscous brown; the immature plumage more like that of the adult, but with both buffy and rufous narrow bars on the breast and abdomen, and (to judge by analogy with other species of *Cuculus*) with juvenal remiges and probably juvenal rectrices as well.

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[41] Ibis, 1921, pp. 92–95.

Roberts[42] has recently stated the immature (juvenal?) plumage of southern birds (typical *clamosus*) is wholly dark fuscous black. It therefore appears that the plumage sequences of the two forms are similar in the first stages, but it would be very surprising if typical *clamosus* were found to have a uniformly dark juvenal plumage and then go through a ventrally barred immature stage to finally achieve a uniform, black adult plumage. The probabilities are that it never develops any barring on the underparts.

The present series from Ethiopia, together with birds from Kenya Colony and the eastern Belgian Congo, exhibits considerable variation in the amount and intensity of the rufous on the breast and lower throat. The one female and one of the males (sex in quotation marks on the label) have the rufous extending in diluted form up to the chin. The light markings on the underparts vary from white to decidedly rusty. The size variation is considerable, the wing length in the males ranging from 161–187 millimeters, in the single female examined, 164.5 millimeters; the tail 147–160 millimeters (males), 150 millimeters (female); the culmen 21–23 millimeters (males), 23 millimeters (female). All the males from Ethiopia are somewhat larger than the one from Kenya Colony available for comparison, but the difference between the latter and the smallest of the former is very slight.

CLAMATOR GLANDARIUS (Linnaeus)

Cuculus glandarius LINNAEUS, Syst. Nat., ed. 10, vol. 1, p. 111, 1758: N. Africa and S. Europe.

Specimens collected:

Male, Gato River near Gardula, Ethiopia, April 20, 1912.

The single specimen collected is in immature plumage, having the crown and nape blackish, the chin, throat, and breast ochraceous yellow, and the primaries rufescent.

This species occurs throughout Africa and all of southern Europe east to Persia. Throughout its extensive range it varies greatly in size but the variations appear to be wholly individual. Grant[43] measured a long series of specimens and found that the breeding birds of southern Europe and Asia averaged larger than those of South Africa, but the overlapping was too extensive to warrant subspecific separation. More recently Meinertzhagen[44] found that eastern breeding birds (Sudan, Egypt, Cyprus, Syria, Palestine, Asia

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[42] Ann. Trans. Mus., vol. 10, pt. 2, 1924, pp. 80–81.
[43] Ibis, 1915, p. 416.
[44] Idem, 1922, p. 53.

Minor) were slightly larger than western examples (Spain, Morocco, West Africa, etc.), but the differences were too slight to warrant taxonomic status. Eastern breeding birds range from 186–224 millimeters (wing length) in the males, from 185–211 millimeters in females; while western ones vary from 199–211 millimeters in males, and 193–199 in females. Mediterranean birds are intermediate in size. It is clear that subspecies can not be maintained on the basis of size characters in this case.

In Africa the great spotted cuckoo is definitely known to breed only south of the Zambesi, but it is highly likely that it does so elsewhere as well. Thus, Van Someren[45] writes of this bird in Kenya Colony that, "* * * December birds were very fat, pointing rather to the fact that they were migrants from the north. May birds were in breeding condition, while the young shot 9. v. 1917 still has a soft bill. These lay regularly in East Africa * * *. There is doubtless a resident bird in East Africa, but whether or not it is the same as the European bird remains to be proved." Sclater and Praed[46] record specimens from the Anglo-Egyptian Sudan in January, March, May, June, and July, and conclude that from these dates, "* * * it appears * * * not unlikely that the great spotted cuckoo breeds in the Sudan, as it certainly does in South Africa * * *." Perhaps the most direct evidence of the breeding of this cuckoo in northeastern Africa is that brought forth by Von Heuglin,[47] who observed the birds pairing in the spring (February and March) in the Sudan and Upper Egypt. Taylor and Brehm procured young as early as February and March in the same region, and Von Heuglin found a fresh egg, ostensibly of this cuckoo, on the ground in April near Saquara. Raw[48] records eggs from Luxor, Egypt, on March 22, and one from Abu Zabaal as late as June 6.

It is true that the South African breeding birds wander north for the southern winter, so that the field study of this species in tropical Africa is complicated by the coincidental presence of resident, breeding and migratory, nonbreeding birds. There can be no possible ground for the old belief that the European birds were double breeders, laying in Europe in June and in Africa in December and January, as was suggested by C. H. B. Grant.[43]

Lynes[49] found none of these cuckoos breeding in Darfur, but observed a marked migration of birds from the south chiefly in June and July, but extending from May to August. Entirely on circumstantial evidence he felt that this summer passage was composed of birds which had bred in Africa somewhere to the south and migrated through western Darfur to spend the nonbreeding season and molt in the northern Sudan. Also, in November and December southbound migrants, apparently European birds, were noted.

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[43] Ibis, 1915, p. 416.

[45] Nov. Zool., vol. 29, 1922, p. 51.

[46] Ibis, 1919, p. 641.

[47] Quoted by Reichenow, Vög. Afr., vol. 2, 1902, pp. 82–83.

[48] Ibis, 1921, p. 361.

[49] Idem, 1925, p. 353.

This species occurs in the Acacia savannas, especially in the more densely wooded parts, but not in real forest. It occurs at sea level [50] and as high as 5,000 feet above the sea. In Ethiopia it apparently is numerous nowhere; in Kenya Colony, only when the migrants add to the number of resident birds does the species become common, and then only locally. It seems that the southern European and western Asiatic birds migrate chiefly down the Nile Valley and the Red Sea, thereby passing on each side of Ethiopia, but only a relatively few birds actually migrate to or through that country.

The fact that in the juvenal plumage the remiges are rufescent suggests that this type of coloration may be of phylogenetic significance, in which case the Asiatic species *Clamator coromandus* would appear to be the nearest to the ancestral stock of the genus.

CLAMATOR JACOBINUS JACOBINUS (Boddaert)

Cuculus jacobinus BODDAERT, Tabl. Pl. Enlum., p. 53, No. 872, 1783: Coromandel coast of India (ex Daubenton).

Specimens collected:

Three male adults, one female adult, and one unsexed, Gato River near Gardula, Ethiopia, April 7 to May 6, 1912.

One male, immature, Turturo, Ethiopia, June 16, 1912.

One male, immature, Reishat, Rudolf, Kenya Colony, May 25, 1912.

The geographic variations of the pied crested cuckoo are rather slight, and, as far as the African birds are concerned, are easily confused because of the migration of the southern race northwards into the territory of the typical form. Hartert [51] has separated the birds of tropical and northern Africa from those of India on the basis of slightly larger size, and has revived the name *pica* Hemprich and Ehrenberg for the former. The wing lengths of Indian specimens are given as 146–153 (average 149.25), while those of African birds are given as 144.5–163 millimeters (average 153). It seems questionable as to whether races based on such small size differences, with such extensive overlapping, are worth recognizing. Inasmuch as this size difference is the only distinctive character of *pica*, I feel it better to consider *pica* a synonym of *jacobinus*. Sclater [52] apparently has reached the same conclusion as have most workers with the exception of Hartert, Oberholser, and Stresemann. The last named[53] does not discuss the Indian birds but apparently considers them distinct from the African ones. He, however, considers *serratus*, which is quite a distinct species, as a southern race of *jacobinus* with two color phases—a normal phase (usually known as *hypopinarus*) and a black phase (typical *serratus*). The range of this supposed dichromatic race is given as southeast Africa, south of the Zambesi. This point of view is quite untenable as black birds, typical *serratus*, occur as far north as Ethiopia (possibly only as migrants, however), and a resident east African race of the black cuckoo (*albonotatus*) is known from Tanganyika Territory and Kenya Colony.

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[50] Zedlitz, Journ. f. Ornith., 1910, p. 743, found it on Dahlak Island, Red Sea.

[51] Nov. Zool., vol. 22, 1915, pp. 253–254.

[52] Syst. Avium Ethiop., 1924, p. 181.

Judging by Hartert's data and the examination of a series of 23 Indian and African specimens I have come to the conclusion that the recognizable subspecies of this cuckoo are as follows:

1. *Clamator jacobinus jacobinus.*—India north to Baluchistan, and tropical Africa generally, south to the Zambesi. It should be noted that Roberts[54] writes that both this bird and *hypopinarus* breed in South Africa. I am quite certain that the breeding records of *jacobinus* in that country really refer to light individuals of *hypopinarus.* Hartert[51] makes the same claim as does Roberts.

2. *Clamator jacobinus hypopinarus.*—South Africa. This form is characterized by having the sides of the throat and neck darker, the middle of the throat and breast with duskier streaks, than in the typical form, but the two overlap considerably. It is a curious fact (and one which argues for the validity of the race) that *hypopinarus* lays pure white eggs while *jacobinus*, in Indian and Ethiopia, at least, always lays green ones.

3. *Clamator jacobinus taprobanus.*—Ceylon. Said to differ from *jacobinus* in being somewhat smaller; not seen by me.

4. *Clamator jacobinus caroli.*—Gaboon, known only from the type, and probably not valid. Hartert[51] suggests that this name be applied to the birds of Benguella, which are intermediate between *jacobinus* and *hypopinarus.* This suggestion appears rather unfortunate as Angolan birds naturally should be intermediate between those two forms on geographic grounds, and intergrades between very similar races are not constant enough in their characters (if they have any) to warrant nomenclatural distinction. At any rate, the type of *caroli* is apparently not like the Benguella birds to begin with, being much larger, and, to judge from the colored figure,[55] darker as well. As long ago as 1905 Erlanger[56] noticed that the birds of southwestern Africa (contiguous to Angola) were not ex-

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[51] Nov. Zool., vol. 22, 1915, pp. 253–254.

[53] Journ. f. Ornith., 1924, pp. 79–83.

[54] Ann. Transvaal Museum, vol. 10, 1924, p. 153.

[55] Cat. Birds Brit. Mus., vol. 19, pl. 11, fig. 1.

[56] Journ. f. Ornith., 1905, p. 483.

actly like *hypopinarus* and he considered them nearer to *jacobinus* with which race he united them, giving the range of the typical bird as India, northeast and southwest Africa, while that of *hypopinarus* as South Africa.

But little has been determined concerning the immature plumages of this cuckoo. Baker[57] writes of the typical race that young birds are brown instead of black above; the wing bar is smaller than in adults and often fulvous white, the chin and throat fulvous gray, the tips of the rectrices and the edgings of the wing coverts fulvous gray. No mention is made of any other differences between young and adults and the natural inference on the part of the reader is that there are none. On the other hand, Reichenow[58] writes that young birds have the back and wings dark brown, the top of the head and the tail black, throat gray, washed with ochraceous yellow, and the rest of the underparts light ochraceous yellow. The two immature males collected by Mearns agree better with Reichenow's description than with Baker's, but the top of the head and the tail are dark brown, and not black. If it should be found that the Indian birds have white underparts in the immature as well as the adult stage, and African ones are yellowish below when young, it will probably be necessary to follow Hartert's classification and recognize *pica* Hemprich and Ehrenberg.

The two young birds are molting into adult plumage, but the one from Reishat, May 25, is much less advanced than the one taken June 15 at Turturo. As far as can be made out, the sequence of feather replacement is as follows:

The first feathers to be shed are the middle pair of rectrices, then some of the inner lesser upper wing coverts and scapulars, then the forehead, upper tail coverts, back, upper wing coverts, inner secondaries and tertials. The underparts are the last to be affected and the molt begins on the flanks and progresses anteriorly and medially. The primaries and most of the secondaries are not shed.

In the region represented by this collection, this cuckoo is not very common. In Ethiopia it has been reported definitely from the following localities: Catchiocha (Hawash district); Mane River; Webi Shebelli; Gadjinja (Hawash district); Barsa River; Anseba Valley (Eritrean-Abyssinian border); Bogosland; Arussiland; Gallaland; Erer Valley in the Harrar district; Waliko; Ambukol; Blue Nile (Sudan border) and near by in Sennar and northern Somaliland and Eritrea, but not commonly.

Thus, Blanford[59] writes that this cuckoo was very rare in the Anseba Valley, and not seen elsewhere. Neumann[60] saw it but once in Ethiopia. He writes that although common in East Africa, it seems to be very scarce in the northeastern part of the continent.

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[57] Fauna of Brit. India, Birds, vol. 4, 1927, p. 168.

[58] Vög. Afr., vol. 2, 1902, p. 79.

[59] Geol. and Zool. Abyss., 1870, p. 313.

[60] Journ. f. Ornith., 1904, p. 381.

In Kenya Colony it has been taken at many places, chiefly in the southern part, along the line of the Uganda Railway. Lamu, on the coast, appears to be the most northern spot in Kenya from which the bird was known previous to the present specimen from Reishat, but the absence of records was not significant as the bird was known from farther north.

Ecologically, it is restricted to the thorny bushveldt, the Acacia and Mimosa savannas and thickets. The breeding season in Ethiopia lasts from March to the middle of June. The eggs are laid in nests of babblers such as *Argya rubiginosa.* Erlanger[56] records eggs as early as March 26 and as late as June 13. One or two eggs are laid in a nest, but usually only one.

CLAMATOR JACOBINUS HYPOPINARUS (Cabanis and Heine)

Coccystes hypopinarus CABANIS and HEINE, Mus. Hein., vol. 4, Heft 1, p. 47 1862: Cape of Good Hope.

Specimens collected:

Two male adults, Gato River near Gardula, Ethiopia, April 7–8, 1912.

These two specimens agree with a series of typical *hypopinarus* from South Africa. They constitute not only the first record for the race in Ethiopia, but the northernmost for the race anywhere, the most northerly point from which the form was previously known being Ruwenzori (two specimens). The South African birds are known to migrate north in February and March, all having left South Africa before the end of March. The presence of these individuals in southern Ethiopia early in April points to an earlier inception of the northward journey than has been suspected hitherto. It also indicates that the birds spread out over tropical Africa east of the Congo forest during the southern winter, a supposition that is substantiated by specimens from Ithanga Hills and from near Kisumu, Kenya Colony. For some reason unknown to me all writers on east African birds have considered all their birds to be typical *jacobinus* and, consequently, the winter range of *hypopinarus* was left unknown and unrecorded. In fact Sclater[61] writes that except for the two birds from Ruwenzori (mentioned above) the winter quarters of *hypopinarus* are unknown.

Lynes[62] writes of *jacobinus* in Darfur that migrants from the south arrived as early as June 24 and that the last one left late in

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[56] Jour. f. Ornith., 1905, p. 483.

[61] Syst. Avium Ethiop., 1924, p. 182.

[62] Ibis, 1925, p. 354.

September. During these three months the birds molted their worn plumage. It may be that the northward migration of the tropical breeding birds (*jacobinus*) starts later than that of *hypopinarus*.

As already mentioned under the typical race, Stresemann's assumption that this form and *serratus* are merely color phases of each other (the name *serratus* being used because of priority) is without foundation, and can not be upheld.

CLAMATOR SERRATUS SERRATUS (Sparrman)

Cuculus serratus SPARRMAN, Mus. Carls., fasc. 1, pl. 3, 1786: Cape of Good Hope.

Specimens collected:

Male, Sagon River, Ethiopia, June 4, 1912.

Soft parts: Iris, dark brown; bill, entirely black; feet and claws, plumbeous black.

This specimen constitutes the first record for the species in Ethiopia and extends the known range of the bird northward by nearly 500 miles. Along the coast, this cuckoo has been taken as far north as Lamu, at the mouth of the Tana River, Kenya Colony, while inland it appears to have been unknown north of the Usambara Mountains, Tanganyika Territory. The single specimen known from the latter locality was made the type of another race, *albonotatus*, by Shelley,[63] on the basis of larger size, and the presence of a large white spot on the outer webs of the two pairs of outer rectrices, and the under tail coverts being broadly tipped with white. A second specimen of *albonotatus* from Mombasa is said to lack the white tips to the under tail coverts. Reichenow[64] considers this form as merely an unusual variant of *serratus* as he has examined typical specimens of the latter from the same general area (north of Lamu). Sclater[65] recognizes *albonotatus* as a valid subspecies. Stresemann,[66] on the other hand, concludes that *albonotatus* has nothing at all to do with *serratus*, but is a melanistic mutation of *cafer*. This decision is based on the large size of *albonotatus*, in which respect it approaches the measurements of *cafer* more than those of *serratus*.

As far as I know, but four examples of *albonotatus* are known, and these four do not agree any too consistently. (The under tail coverts may or may not have white tips.) The variability of the birds taken into consideration together with the fact that in size they are more or less intermediate between *cafer* and *serratus* suggests a possible hybrid origin. As against this suggestion, the geographical contiguity of the stations in which *albonotatus* has been taken (Usambara Mountains, Mombasa, and Takaungu) stands out as indicative of the validity of that form as a racial aggregate.

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[63] Proc. Zool. Soc. Lond., 1881, p. 594.

[64] Vög. Afr., vol. 2, 1902, p. 76.

[65] Syst. Avium Ethiop., 1924, p. 182.

[66] Journ. f. Ornith., 1924, pp. 79–83.

Percival[67] writes that in the coastal district of northern Tanganyika Territory and southern Kenya Colony (Mount Kilimanjaro to Mombasa and Takaungu) *albonotatus*, "* * * seems to visit this part of Africa for about six weeks only in the year." If this statement be corroborated by future investigations, and *albonotatus* be found not to breed during those six weeks (the two specimens procured by Percival were collected in March), then the geographical arguments for its recognition as a race might have to be discarded.

Much more material and data are needed to settle this problem.

In this connection it is worthy of note that adults from South Africa have a tendency to show a very few white feathers here and there on the sides of the throat and on the abdomen.

However, as far as the present specimen is concerned, all this is not particularly pertinent, as the Sagon River bird is typical *serratus* in size and coloration. Sclater[65] says that *serratus* is known from the Cape Province and Natal, "* * * north to southern Transvaal only, from October to March, when it breeds; winter quarters unknown." Reichenow[64] in 1902 wrote that he had a specimen of typical *serratus* from Lamu, a record that Sclater appears to have overlooked. The matter is further complicated by the fact that the Lamu bird was collected in October, but it probably was a belated migrant, and not a resident. The present specimen collected by Mearns on June 4 therefore appears to be the first definite "wintering" bird yet known. It is molting into adult plumage from the immature feathering, but is fully grown. Its measurements are as follows: Wing, 150; tail, 170; culmen, 20 millimeters, while two adults from South Africa present the following: Wing, 153–154; tail, 184–185; culmen, 20.5–21.5 millimeters. The difference in the length of the tail is to be accounted for by the fact that the middle rectrices are broken in the Ethiopian bird.

Nothing seems to be known of the immature plumage of this cuckoo, and therefore the following notes may be of interest. The only old (immature) feathers left in the present specimen are some of the remiges and rectrices, which are dull brownish. Another specimen (from South Africa) is in adult plumage, but has numerous dark brownish fuscous feathers mixed with the glossy black ones on the breast and abdomen, the lores, auriculars, and nape. It would appear, then, that the immature plumage of the black-crested cuckoo is largely dull, dark brownish, lighter on the wings and tail. Judging by the very abraded condition of the remiges and rectrices in the Sagon River specimen it seems as though these feathers are juvenal ones which are not shed in the postjuvenal molt, but are retained throughout the immature plumage.

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[64] Vög. Afr., vol. 2, 1902, p. 76.

[65] Syst. Avium Ethiop., 1924, p. 182.

[67] Quoted by Bannerman, Ibis, 1910, p. 704.

Mearns recorded seeing four of these cuckoos on the Sagon River, June 3–6, and two at Turturo, June 15–17.

LAMPROMORPHA CAPRIUS (Boddaert)

Cuculus caprius Boddaert, Tabl. Pl. Enlum., p. 40, No. 657, 1783: Cape of Good Hope.

Specimens collected:

Female adult, Gato River near Gardula, Ethiopia, April 15, 1912.
Male immature, Turturo, Ethiopia, June 16, 1912.

The didric cuckoo occurs throughout Africa from Ethiopia, Eritrea, Bogosland, southern Sudan, the Lake Chad district, Cameroon, Northern Nigeria, Sierre Leone, and Gambia south to the Cape of Good Hope. The species varies greatly in size, and it has been suggested that the birds of the northwestern part of the range are distinct from the others. Hartert [68] separated the Senegal birds on the basis of smaller size (wing, male, 108–112 as against 118–121 millimeters in South African birds; female, 110–117 as against 124–125 millimeters in South African specimens), and revived for them Heine's name *chrysochlorus*. Bannerman [69] and Sclater [70] both independently concluded that Hartert was mistaken, as their study of the series in the British Museum refuted the decision reached by the latter's study of the material at Tring. Roberts [71] submitted measurements of South African birds which upheld the findings of Sclater and Bannerman. Gyldenstolpe,[72] on the other hand, agreed with Hartert and recognized *chrysochlorus*. Recently Grote [73] has found that the characters of *chrysochlorus* are not constant, and although using that name for his birds from the grasslands of northern Cameroon, he admits that the race is not well defined.

In the present connection I have examined and measured some 50 birds from South Africa, Tanganyika Territory, Kenya Colony, Uganda, Belgian Congo, Ethiopia, Cameroon, and Liberia, and as far as the material goes, the only possible conclusion seems to be to consider *chrysochlorus* as a synonym of *caprius*. This is based, not on the examination of Senegalese birds, but on the fact that birds from elsewhere (South and East Africa) present measurements which completely overlap those given by Hartert for the Senegambian race. If Grote's northern Cameroon birds are *chrysochlorus*, then specimens from Liberia should belong to that race as well. While it is true that two birds from that country examined by me are small (wings 109 and 113 millimeters, respectively) they are matched by others equally small from South Africa.

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[68] Nov. Zool., vol. 28, 1921, p. 100.
[69] Idem, vol. 29, 1922, pp. 416–417, and Revue Zool. Afr., vol. 10, 1922, p. 128.
[70] Bull. Brit. Orn. Cl., vol. 42, 1922, pp. 118–119.
[71] Ann. Trans. Mus., vol. 10, 1924, p. 82.
[72] Kungl. Sv. Vet.-Akad. Handlgr., 1924, p. 249.
[73] Journ. f. Ornith., 1925, p. 83.

This cuckoo occurs throughout the region covered by the present paper, but is rather local in Ethiopia and less common there than in Kenya Colony. Thus, Blanford [74] found it to be rather scarce in the Anseba Valley (Eritrea) and did not meet with it at all in Ethiopia. Neumann [75] likewise did not see this species in Shoa and southern Ethiopia, but met with its relative *L. klaasi* only. On the other hand, Erlanger [76] reported it as not uncommon in Ethiopia, Shoa, and Gallaland, and observed it in the highlands as well as in the valleys and lowlands. He found it quite numerous at Adis Abeba and writes that it occurs in bushy hillsides, in valleys with rich vegetation, and in the gardens of the Gallas. In Kenya Colony it is very common and widespread and is known from a great many stations. It is less a bird of the forest than *klaasi* and prefers the denser part of the Acacia-Mimosa savannas, but also occurs in the more open parklike country where trees are fewer and further apart. Between March and October the number of these cuckoos in East Africa is augmented by the presence of the "wintering" birds that breed in South Africa. Just how far north the southern birds actually wander is not definitely known. Stark and Sclater [77] write that it "* * * is found in South Africa only in the summer from October to May, and appears to migrate during our winter to the Upper Nile Valley and Abyssinia, and perhaps to West Africa * * *." Zedlitz [78] writes that in Eritrea the species seems to occur only during the rainy season, all having departed by the end of May. His collector remained there until late in July and saw none. Heuglin noted that the appearance of this cuckoo seemed to coincide more or less with the inception of the rains. This points to a further complication in the task of unravelling the distributional problems of this bird, as at the same time (approximately) when southern breeding birds are flying northward the resident birds of northeastern Africa are also shifting about, just where to no one knows. In tropical Africa the breeding birds are more or less sedentary but the region is periodically inundated with southern migrants and northern wanderers. The movements of the latter group seem rather irregular

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[74] Geol. and Zool. Abyss., 1870, p. 313.

[75] Journ. f. Ornith., 1904, p. 382.

[76] Idem, 1905, p. 485.

[77] Fauna of South Africa, Birds, vol. 3, 1903, p. 190.

[78] Journ. f. Ornith., 1910, p. 743.

(except locally) and may be considered as wanderings rather than as definite migrations.

CENTROPUS MONACHUS MONACHUS Rüppell

Centropus monachus Rüppell, N. Wirbelth., Vög., p. 57, pl. 21, fig. 2, 1837: Kulla, North Ethiopia.

Specimens collected:

Male adult, northeast Lake Abaya, Ethiopia, March 16, 1912.

Male adult, Gato River near Gardula, Ethiopia, April 1, 1912.

Male, immature, Gato River near Gardula, Ethiopia, April 17, 1912.

Soft parts: Iris, scarlet.

The taxonomy and nomenclature of the races of the blue-headed coucal have been misunderstood in so many different ways that the literature of the species is very confusing. The trouble began with the description of a new species by Reichenow[79] who gave it the name *fischeri* and, it must be admitted, wrote a quite inadequate diagnosis of it. The type came from Niakatschi, southeast of Lake Victoria.

Zedlitz[80] briefly reviewed the races of this bird and recognized four forms—*monachus*, *occidentalis*, *angolensis*, and *cupreicaudus*. He did not mention *fischeri* or dispose of it as a synonym, and it is therefore to be supposed that he considered it as specifically distinct. In 1911 Neumann[81] described a bird from the Bahr-el-Ghazal under the name *heuglini*. There the matter rested until four years later Claude Grant[82] studied this coucal and decided that *occidentalis*, *angolensis*, and *heuglini* were all the same and that all three were synonyms of *fischeri*, which name he then supplied to the blue-headed coucals of the upper Nile Valley, the Sudan, to the east shore of Lake Victoria, and west to northern Angola and to the Gold Coast. Sclater and Praed[83] followed Grant, but Gyldenstolpe[84] wrote that while the material available to him was not sufficient to attempt a revision, yet it did not confirm Grant's conclusions.

Bannermann[85] carefully reviewed the systematics of the *C. monachus* group, and, partly guided by a letter from Oscar Neumann, treated *fischeri* as a distinct species and resurrected the names that Grant had sunk into synonymy, recognizing five forms (the four that Zedlitz had listed and *heuglini*): In the letter referred to, Neumann stated the characters of *fischeri* to be as follows: "* * * a totally different looking bill which is more curved and thinner than in any other species of African *Centropus* * * * the lower mandible of *C. fischeri*, seen from below, is *amber yellow* * * * the whole upper side of *C. fischeri* is blackish olive brown. There is no gloss on the black head * * * the yellowish-buff eye streak is another very prominent character of *C. fischeri*." Of *C. monachus heuglini* Bannerman writes that if, "* * * this race is not accepted the Sudan birds must be called *occidentalis* and not *fischeri*."

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[79] Journ. f. Ornith., 1887, p. 57.

[80] Idem, 1910, pp. 741–742.

[81] Verh. V. Intern. Ornith. Kongr. for 1910 [published 1911], p. 504.

[82] Ibis, 1915, pp. 421–422.

[83] Idem, 1919, p. 646.

[84] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 251.

[85] Rev. Zool. Afr., vol. 10, 1922, pp. 130–132.

Sclater[86] lists *fischeri* as a distinct species, likewise *cupreicaudus*, while *angolensis* and *heuglini* he apparently considers as synonyms of *occidentalis*. As far as *C. monachus* figures in his list, it is credited with but two races, the typical one, and *occidentalis*. I have given all the above data to show why Sclater lists the birds as he does, inasmuch as his list will undoubtedly be consulted by all workers in African ornithology. There now remains to be shown why this arrangement can not be accepted. Stresemann[87] has recently shown very conclusively that *fischeri* was based on immature specimens, and that all the characters mentioned by Neumann are those of immaturity and that the birds belong to the species *monachus* and are the same as the form named *heuglini* in 1911. In this connection it should be noted that Sclater and Praed[83] found that some of the birds from the Upper Nile and Mongalla Provinces of the Sudan were quite noticeably darker than others collected at the same time of the year in the same localities. This rather puzzling state of affairs is not only clarified by Stresemann's discovery that the birds of this part of Africa have dark immature plumages (*fischeri*) and more ordinary *monachus*-like adult featherings, but serves to corroborate his conclusions. As the name *fischeri* has priority over *heuglini* the latter goes into synonymy. It should be understood that this race is best characterized by the immature plumage, and in the adult stage is more or less intermediate between its geographical neighbors, *monachus* on the east, and *occidentalis* on the west. However, it is dark backed as a rule in the adult, and occasionally very dark. A male from Mabira, Uganda, in the Museum of Comparative Zoölogy, is of this dark type. Reichenow[88] refers to another dark adult from Bussisi as "var. *nigrodorsalis*." Granvik[89] records an adult male from Kiambu, Kenya Colony, with a blackish-brown back, "* * * almost the same color as *Centropus* (*monachus*)

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[83] Ibis, 1919, p. 646.

[86] Syst. Avium Ethiop., 1924, pp. 185–186.

[87] Verh. Ornith. Ges. Bayern, vol. 16, Heft 1, 1924, pp. 54–55.

[88] Vög. Afr., vol. 2, 1903, p. 63.

[89] Journ. f. Ornith., 1923, Sonderheft, pp. 77–78.

fischeri * * *." In a footnote he writes that this may be an unnamed new form of "* * * *C. monachus*, but according to Grant * * * the true *C. m. monachus* occurs southward to Kikuyu. But it resembles the central Abyssinian form * * * *occidentalis* * * *." This last sentence is doubtless intended to read central African, not Abyssinian. However, he continues by stating that his specimen (1), "* * * is in the beginning of the molt, and that is why the color of the back is different from that of specimens in fresh plumage," which are said to be lighter.

This takes care, I think, of the bird of the Nile Valley and Uganda—*C. monachus fischeri.* There still remain to be discussed *angolensis* and *cupreicaudus.* The western *occidentalis* is recognized as valid by all workers, and need not detain us here. It is characterized by the dark olive-brown secondaries; otherwise like *monachus.* As mentioned above, Sclater does not mention *angolensis* in the Systema Avium Ethiopicarum but evidently considers it the same as *occidentalis*, while *cupreicaudus* is granted specific rank. I have seen no specimens of *angolensis*, but the characters given by Neumann are as follows: Intermediate in every way between *occidentalis* and *cupreicaudus;* the gloss of the head intermediate between the steel blue of the former and the purple of the latter; the tail nearly the same coppery bronze as in the latter; etc. Hartert,[90] in his notes on the types of birds in Tring Museum, lists *angolensis* as valid with a query. He says that all the characters given by Neumann appear to be rather without meaning, and that the only distinctive feature of the form is the buffy barring of the rump and upper tail coverts. However, this likewise occurs in some East African birds, so on the whole, the case for *angolensis* is none too good. Of the validity of this form I can form no definite opinion as I have seen no material, but the intermediate character of the north Angolan birds indicates that *cupreicaudus* is a race of *monachus* (joined by intergrades, which, if worthy of nomenclatural recognition, would have to be called *angolensis*) and not a distinct species as Sclater lists it. Roberts[91] proposes to make *cupreicaudus* the type of a new genus, *Megacentropus*, but whether he would separate it generically from *monachus* is not stated.

The races of the blue-headed coucal are as follows:

1. *Centropus monachus monachus.*—Eritrea, Ethiopia, and northern Kenya Colony, south to the Kikuyu district.

2. *Centropus monachus fischeri.*—The upper Nile Valley in the Sudan and Uganda, east to the Abyssinian escarpment and the Rift Valley, and in the south, limited by the Nile-Congo divide, which it does not cross.

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[90] Nov. Zool., vol. 32, 1925, pp. 152–153.

[91] Ann. Trans. Mus., vol. 8, 1922, p. 220.

3. *Centropus monachus occidentalis.*—West Africa from the Gold Coast, Nigeria, Cameroon, Gaboon, and northern Angola (possibly distinct—*angolensis*) east to the northern Belgian Congo and the Sudan to the southwestern side of the Congo-Nile watershed.

4. *Centropus monachus cupreicaudus.*—Southern Angola, Bechuanaland, the Zambesi Valley, and southern Nyasaland.

The geographical variations of this species afford a clue as to its center of origin and to the apparent phylogenetic relationships of its races. The coppery tailed form is obviously an offshoot of the green-tailed birds as the latter character occurs over a very much greater area than the former, and among green-tailed birds there seems to be a tendency to produce bronzy or coppery rectrices. Several such cases are known in *monachus* and in *occidentalis.* The dark-backed green-tailed form *occidentalis* seems to be the ancestral type and the birds become lighter backed in the northeastern part of the range of the species (*m. monachus*). That dark backs are more ancient than light ones in this group, is indicated by the fact that in the geographical aggregate of individuals in the region between the two extremes (*fischeri*), the dark back character is more striking in the immature than in the adult plumages. It looks as though the lighter back is a more recently acquired coloration. Of course, it should not be forgotten, for the sake of the above argument, that adults of *fischeri* are usually dark, even darker than *occidentalis*, but not markedly so. Apparently, then, *occidentalis* represents the original condition which has given rise, on the one hand to *cupreicaudus*, and, on the other, to *fischeri* and *monachus.* The " typical " race is far from being typical of the specific stock.

The species has three distinct plumages, as follows:

The juvenal plumage resembles the adult stage on the underparts except that the feathers of the throat and upper breast are weaker, making the shafts appear more conspicuous. Above it is quite different. The head, nape, and hind neck are dull black, the feathers dark brown for their basal halves; the entire back dark brown transversely banded with pale rufous brown; inner secondaries like the back; outer secondaries and primaries bright rufous, barred with dull dark brown on the terminal third of their length (half on the outermost primaries); upper wing coverts grayish rufous, barred narrowly with fuscous brown; rectrices greenish brown, tipped with dull brown which is crossed by two narrow white bars, one terminal, the other between the green and the brown; sometimes other narrow white lines are faintly visible as well. A complete postjuvenal molt replaces this plumage by the next.

The immature bird has only a very little bluish sheen on the nape; has the scapulars, interscapulars, back, and wings narrowly barred with fuscous black; and the rectrices tipped with whitish and narrowly banded with the color on their apical portion (from three to six white transverse bars on each feather, noticeable chiefly on the underside), the barrings continuing, but faintly, much further basally on the outer webs of the lateral three pairs of tail feathers. Otherwise the bird resembles the adults, except for a few light straw-colored feathers on the lores, which are not present in older individuals.

The adult plumage is well known and needs no redescription.

Centropus monachus monachus occurs throughout Ethiopia, but not in the lowlands. Blanford [92] never saw it much below 7,000 feet (2,100 meters) nor above 8,500 feet (2,550 meters). "Its range may be greater, but it is probably confined to the temperate region. It was met with in thick bushes, often on the banks of streams * * *."

That its altitudinal range is greater than this is shown by the specimens Mearns collected near Gardula at an elevation of only 4,000 feet. Neumann [93] observed it at Aletta in Sidamo, Bolagoschara in Doko, Anderatscha in Kaffa, as well as in Metscha, Djamdjam, and Gardula. Erlanger [94] obtained one at Maki River; Zedlitz [95] found it at Mai Atal and at The Mareb Stream; while earlier explorers such as Von Heuglin and Rüppell, procured specimens in northern Ethiopia (Tigre, etc.). In Kenya Colony it is known from Nairobi, Kyambu, Fort Hall, and other localities.

The breeding season, according to Von Heuglin, in the Sobat Valley, is in January and February; in central Ethiopia, in May. However, Neumann [93] shot a hen with an egg almost ready to be laid, on December 14, at Aletta, Sidamo.

Mearns met with this coucal at Aletta, March 7–15, 2 birds seen; at the Abaya Lakes, March 18–26, where he noted 32 individuals; and at the Gato River March 29 to May 17, where 10 were seen.

CENTROPUS SUPERCILIOSUS SUPERCILIOSUS Hemprich and Ehrenberg

Centropus superciliosus Hemprich and Ehrenberg, Sym. Phys., fol. R., pl. 11, 1828: South Arabia.

Specimens collected:

One unsexed, Dire Daoua, Ethiopia, October 12, 1911 (A. Ouellard collection).

One male, Gada Bourca, Ethiopia, December 24, 1911.

One female, Sadi Malka, Ethiopia, January 28, 1912.

One male, Lake Abaya, east, Ethiopia, March 20, 1912.

Three males, two females, and two nestlings, Gato River, near Gardula, Ethiopia, April 10 to May 8, 1912.

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[92] Geol. and Zool. Abyss., 1870, p. 314.

[93] Journ. f. Ornith., 1904, pp. 379–380.

[94] Idem, 1905, p. 480.

[95] Idem, 1910, pp. 741–742.

One male, Bodessa, Ethiopia, May 31, 1912.

One male and one female, Sagon River, Ethiopia, June 3–5, 1912.

One female, North Rudolf, Womo River, Kenya Colony, May 30, 1912.

One male, Endoto Mountains, south, Kenya Colony, July 21, 1912.

One male and one female, Lekiundu River, Kenya Colony, August 4–5, 1912.

One female, Tana River, camp 6, Kenya Colony, August 21, 1912.

One female, between Thika and Athi Rivers, Kenya Colony, August 29, 1912.

Soft parts: Iris, red; bill, black; feet, plumbeous, with black claws.

In studying the subspecies of the white-browed coucal, I have carefully examined a series of 75 specimens, distributed as follows: Ethiopia, 14; British Somaliland, 4; Sudan, 7; Kenya Colony, 40; Tanganyika Territory, 6; Uganda, 2; Belgian Congo, 2. The Socotra Island form I have not seen. Sclater [96] recognizes three races—the typical one, living in southern Arabia and northeastern Africa (Sudan, Ethiopia, Eritrea, Somaliland, and Kenya Colony); *loandae*, a darker backed form found from the "* * * Congo River south to Angola, east to Uganda and the north end of Lake Nyasa (possibly to the Zambesi Valley and also to the lake district of southern Ethiopia)"; and *sokotrae*, known only from the island of Socotra.

Three other races have been proposed as well. They are *intermedius* Van Someren,[97] *niloticus* Sztolcman,[98] and *meridionalis* Madarász.[99] These may be considered at this point. The first named, *intermedius*, is said to be characterized by being darker above and smaller than typical *superciliosus*. Some years ago I had the opportunity of examining Van Someren's series in Nairobi and came to the conclusion that, although the differences between it and the typical form were slight, yet the East African race was recognizable. In 1926 [1] I renamed it *furvus* as Van Someren's name was found to be preoccupied by *Centropus sinensis intermedius* Hume. However, since then I have examined over a hundred birds in all, and with each additional specimen, the case against *furvus* becomes stronger. Neither the size nor the color differences hold, and I am convinced that *furvus* must be relegated to the synonymy of *superciliosus*. Birds from northeastern Africa (Sudan, Ethiopia, and Somaliland) present the following wing measurements: Male,

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[96] Syst. Avium Ethiop., 1924, pp. 186–187.

[97] Nov. Zool., vol. 29, 1922, p. 50: Mombasa.

[98] Ann. Zool. Mus. Pol., vol. 3, 1925, p. 160: Kenissa, White Nile.

[99] Ann. Mus. Hung., vol. 12, 1918, p. 584: "East Africa."

[1] Auk. vol. 43, p. 370.

148–167; female, 155–163 millimeters; while specimens from farther south (Kenya Colony, Tanganyika Territory, and Uganda) have the following: Male 142–162, female 149–173 millimeters. The form *furvus* is obviously a very variable group of individuals, as would be expected of any intermediate aggregate connecting two peripheral races.

In his notes on the types of birds in the Tring Museum. Hartert [2] writes that the East African form (*intermedius*) does, "* * * not always differ from the south Arabian specimens in being 'darker above and smaller.' It therefore requires confirmation." Other recent writers who have dealt with this race agree in considering it unrecognizable.[3] Incidentally, Granvik's notes are of interest in connection with Madarász's race *meridionalis* and will be referred to again.

The second so-called subspecies, *niloticus*, was based on a single specimen from Kenissa, White Nile, which was compared with a single specimen from "East Africa" which Sztolcman considered to be typical *superciliosus*. This, in a very variable species. The supposed characters of *niloticus*—short culmen and grayish auriculars—are nothing but individual in nature. The form has never been accepted by any other worker, but, to judge from the literature, it has been overlooked by most. Sclater and Praed [4] make no reference to it in their list of Sudan birds, and even Gyldenstolpe,[3] who gives and disposes of most of the recent synonyms of the species in his collection, likewise omits it from his notes.

The third proposed race, *meridionalis*, is similarly easy to dispose of. Madarász had a small series of birds from the Sudan and Ethiopia, all of which had the ground color of the underparts pure white. He found that his series (also small) from East and Southeast Africa had the ground color of the underparts tinged with reddish, and on this basis, he separated the latter under the name *meridionalis*, naming no type or type locality, and giving no definite geographic range for the form. Anyone familiar with East Africa would immediately suspect that the reddish ventral tinge was due to earth staining, and, as a matter of fact, Granvik [3] writes as follows of two birds taken near Nairobi. "* * * They are * * * brownish red all over the undersurface of the body * * * but this * * * color disappears at once if a damp piece of cotton wool is drawn across the feathers, and is thus only a superficial wash caused by the discoloration of the ground." Of the large number of East African birds examined in the course of the present study, quite a few have more or less of this staining present. Fortunately, *meridionalis* has been ignored or overlooked by all writers, and has not materially added to the confusion in the literature.

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[2] Nov. Zool., vol. 32, 1925, p. 153.

[3] See Granvik, Journ. f. Ornith., 1923, Sonderheft, pp. 80–82; Gyldenstolpe, Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 252, etc.

[4] Ibis, 1919, p. 647.

The two nestlings from Gato River, are somewhat doubtfully referred to this species and not to *C. monachus*, which was also collected there, but their identification is probably correct. They have long, filamentous, unbranching white trichoptiles on the upper parts, and practically none on the underside, the few present being very small, varying from 0.5 to 1.5 millimeters in length. Those on the dorsum measure from 14 to 28 millimeters in length. The dorsal skin is dull black, the ventral yellowish merging into blackish laterally. Lönnberg[5] has described the pterylosis of a nestling coucal (perhaps *C. leucogaster*) and has noted that the pteryla spinalis extends unbroken and " * * * with about equal breadth from the nape (where it is continuous with the covering of the head) to the tail * * *. On either side of this *pt. spinalis* extends a broad apterium from behind the ear coverts to the sides of the tail * * *." The spinal feather tract in the present examples of *superciliosus* begins on the mid line at the nape and then bifurcates slightly on the upper back and the two bands unite again medially on the rump. The peculiar nature of these downy feathers justifies the use of the name trichoptiles for them in distinction from the ordinary neossoptiles of most birds.

Immature birds resemble the adults on the underside but have the upper parts quite different. The feathers of the top and sides of the head, the nape, and interscapulars have wide buffy shaft streaks, those of the interscapulars terminating distally in enlarged light spots. The upper back and upper wing coverts are finely barred with blackish; the remiges likewise barred, chiefly toward the distal ends, the variation in this respect, and with regard to the width of the black marks, being considerable; the tail feathers are more extensively barred with white (in one bird all the rectrices are thus barred throughout their entire lengths, in another, all but the outermost pair; in still another, transverse lines become indistinct about halfway down the feathers); the bill, instead of being black as in the adults, is brownish or yellowish brown. Granvik[3] writes that the rectrices are more glossy greenish in young birds than in adults. This is not so, as this difference is wholly one of feather age. Fresh ones are glossy green, older, more worn ones are less so, and very old, abraded feathers are almost brownish with practically no greenish shade.

To judge from a series of eight birds intermediate between true immature and fully adult plumage, it seems that it takes three years to acquire the final type of feathering. The subadult birds resemble the adults but have the remiges barred distally. However, these remiges are not those of the juvenal plumage but are new feathers. The postjuvenal molt appears to be a complete one. Even in the subadult plumage the innermost remiges vary considerably in darkness, producing birds of both the *superciliosus* and ≷ *loandae* types. Birds in this stage have the rectrices more rounded, less tapering terminally than younger birds.

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[3] See Granvik, Journ. f. Ornith., 1923, Sonderheft, pp. 80–82; Gyldenstolpe, Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 252, etc.

[5] Ibis, 1923, pp. 49–52.

The order of molt of the remiges seems rather peculiar, but I have not enough molting material to work it out satisfactorily. A subadult female, taken August 5 at Lekiundu River, has the three outermost primaries of the adult plumage, the next one is immature, that is, barred, while the next, which is only half grown, is adult. An adult bird from Dire Daoua, October 12, has the fourth (from the outside) primary of the left wing only half grown, while the remex on either side of it is fully grown. However, inasmuch as this condition is not duplicated in the right wing, it may be that the feather was lost by accident rather than by molt and is being replaced out of season.

As already mentioned, Sclater suggests that *loandae* may range north to the lake district of southern Ethiopia. The birds from that region (Lake Abaya, Gato River, Sagon River, etc.) are variable, some being much darker than others, but on the whole are more like *superciliosus* than *loandae*, or at least, more of them are like the former than the latter.

The white-browed coucal is widely distributed in Ethiopia and Kenya Colony and is the commonest member of its genus in those countries. It appears to be confined to the tropical and subtropical parts of the region and its range overlaps that of *C. monachus* only locally. The latter is more of a highland, Temperate Zone bird, but occurs around Nairobi where *superciliosus* is found as well. Blanford[6] found the latter abundant on the Libka River and met with it in the Anseba Valley in smaller numbers, but never found it in the Abyssinian highlands, that he traversed. He records measurements of the two sexes of *superciliosus*, but his "female" appears to have been wrongly sexed. Females are larger than males in this species. Neumann[7] met with it chiefly in the vicinity of rivers and lakes, as on the Urga and the Bussijo in Gindeberat Province, and around Lakes Abaya and Gandjule. Erlanger[8] recorded it in Ennia and Arussi-Gallaland, on the route from Harrar to Ginir, in the Hawash region, at Lake Abaya, and on the route from Bardera to Umfudu.

Judging from the dates of the two nestlings, and from the data presented by Erlanger, the breeding season in Ethiopia appears to be from early April until late May. The two nestlings described above were brought in with the nest and another nestling by a native boy. Mearns wrote in his diary that—

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[6] Geol. and Zool. Abyss., 1870, p. 315.

[7] Journ. f. Ornith., 1904, p. 380.

[8] Idem, 1905, p. 481.

> * * * the nest is a slovenly structure compounded of a messy mixture of coarse grasses and dry leaves, small sticks, and a good deal of dirt mixed with rubbish from the ground.

Besides the specimens collected, this coucal was observed as follows: Aletta, March 7–13, 4 seen; Loco, March 13–15, 2; Gidabo River, March 15–17, 2 birds; Abaya Lakes, March 18–26, 68; near Gardula, March 26–28, 10 seen; Gato River, March 29 to May 17, 100; Bodessa and Sagon River, May 18 to June 6, 100; Tertale, June 7–12, 20 seen; El Ade, June 12–14, 30; Mar Mora, June 15, 20 birds; Turturo, June 15–17, 10 seen; Anole, June 17, 10; Wobok, June 18, 10 seen; near Saru, June 19, 10 birds; Yebo, June 20, 4 noted; Karsa Barecha, June 21, 4 birds; Northern Guaso Nyiro River, July 31 to August 3, 12 seen; Lekiundu River, August 4–8, 10 birds; Meru and Kilindini, August 9–10, 22 birds; Tharaka district, August 11–13, 70; Tana River, August 14–23, 71 birds; Thika River, August 23–27, 95 birds seen; west of Ithanga Hills, August 28, 10 noted; Athi River, August 29 to September 2, 28 seen; Nairobi, September 3–4, 2 birds noted.

Order PSITTACIFORMES

Family PSITTACIDAE

POICEPHALUS GULIELMI MASSAICUS Fischer and Reichenow

Poeocephalus massaicus FISCHER and REICHENOW, Journ. f. Ornith., 1884, p. 179: Meru Mountain, near Kilimanjaro, Tanganyika Territory.

Specimens collected:

Female, Escarpment, 7,390 feet (2,200 meters), Kenya Colony, September 8, 1912.

The material of this parrot available for study is unfortunately inadequate for revisionary work. It consists of 28 specimens of *massaicus* and two of *aubryanus*. The latter form (Cameroon birds seen) has a distinctly longer culmen than *massaicus*, the latter varying from 27 to 31 millimeters, while *aubryanus* measures from 31.5 to 34 millimeters (culmen measured from the cere). In other dimensions the two forms are alike as may be seen from the wing lengths—*aubryanus*, 200–207 millimeters; *massaicus*, 196–206.5 millimeters. As far as the limited material goes, it substantiates Neumann's conclusions.[9] Sclater has followed Neumann in his list[10] and the agreement of these two authors is indicative of the correctness of their conclusions. It should be noted, however, that some dissension as to the races of this bird does exist. Sassi[11] records Grauer's specimens from Moëra and Mawambi, eastern Belgian Congo as *aubryanus* while both Neumann and Sclater restrict the range of *aubryanus* to West Africa from Cameroon to Gaboon and include the eastern Congo in that of typical *gulielmi*. However, of the four examples collected by Grauer only one is large enough to be referred to *aubryanus* and the other three are nearer to *gulielmi*. Inasmuch as both forms are conspecific, there is nothing surprising in that one race may occasionally produce an individual large enough to match specimens of another subspecies. These birds seem better considered as *gulielmi*, but it should be kept in mind that the two races are not always too well defined, and may meet in the eastern Congo.

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[9] Nov. Zool., vol. 15, 1908, pp. 381–382.

[10] Syst. Avium Ethiop., 1924, p. 199.

Young birds in juvenal plumage lack the red on the forehead, wings, and tibiae, but aside from this point on which there seems to be general agreement, no two descriptions tally. Van Someren[12] writes that young birds are bright green like adult females, but have dark, horny, grayish brown bills. Granvik[13] notes that the young bird has—

> "* * * the crown and neck purely green, without any mixture of either brown or cobalt blue, found in the old birds. Further, the lower wing coverts are not uniform green as in old birds but are furnished with a prominent gold-yellow border. Then again the feathers of the tail, both on the upper and lower surface, are brownish red at the tips, inside these, greenish brown and then the same color as in the old birds."

I have examined but one young bird, a juvenal female from Cameroon (*aubryanus*), but from the condition of this specimen and the data afforded by Van Someren and Granvik and others, it appears that it takes about three years for the bird to acquire full adult feathering. This young bird is in an early stage of the post-juvenal molt and thereby shows, in part at least, two plumages. The juvenal plumage differs from subsequent ones in that the forehead is dusky fuscous brown, the extent of this color being rather narrow; the rest of the top of the head to the nape and the auriculars are buffy brown, the feathers narrowly tipped with greenish; the wing coverts and interscapulars, Prout's brown narrowly edged with grape green; remiges and the rectrices as in adults but slightly lighter and more pointed terminally; underparts slightly greener, less bluish than in adults.

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[11] Ann. K. K. Naturhist. Hofmus. Wien, vol. 26, 1912, p. 363.

[12] Nov. Zool., vol. 29, 1922, p. 46.

[13] Journ. f. Ornith., 1923, Sonderheft, pp. 72–73.

This plumage is retained for about a year when it is partly replaced (all but the remiges and rectrices) by the immature plumage which resembles the adult stage but has the reddish color present chiefly on the forehead, and only a little of it on the bend of the wing and the tibiae. Furthermore, the red is more of an orange red in immature birds and deeper red in adults. Shortly after this plumage is acquired the remiges and rectrices are replaced by dark fuscous-black ones which are retained through the first adult plumage. As far as I can discover, the peculiar rectrices described by Granvik[13] are not normal, even if his description be applied to the upper tail coverts rather than the tail feathers themselves.

In adult birds the extent of the red on the head is very variable. In some it extends back to the anterior margin of the eye, in others to the middle of the eye, while in one it actually extends beyond the posterior end of the eye. Granvik[13] also records such an individual.

This bird occurs chiefly in the highlands and mountains of southern Kenya Colony and northern Tanganyika Territory. It does not seem to have been taken north of Mount Kenia, Sigeyo on Lake Baringo, Mau, Kijabe, Burnt Forest, Elgeyu Forest, Aberdare Mountains, Eldoret, and Mount Elgon, or south of Great Arusha (near Mount Meru). It is rather strange that it has not been found on Mount Kilimanjaro itself, although it occurs nearby in the lower forests at Taveta, Chala Mountain, and Lake Jipe. It has been taken at altitudes of as much as 10,700 feet (3,200 meters). (Mount Kenia, E. A. Mearns, Roosevelt Expedition.)

Inasmuch as size is of systematic interest in this species, the following table may be of use to students.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Kenya Colony:					
Escarpment, 7,390 feet (2,200 meters)	♀	206. 0	98. 0	28. 0	20. 0
Fay's farm, 8,000 feet (2,400 meters)	♀	200. 0	95. 0	27. 5	19. 0
Do	♀	204. 0	88. 5	27. 5	19. 0
Do	♀	206. 0	88. 0	29. 5	19. 0
Mount Kenia, 10,700 feet (3,200 meters)	♀	200. 0	90. 5	28. 0	20. 0
Do	♀	202. 0	93. 0	27. 0	20. 0
Mount Kenia, 8,500 feet (2,550 meters)	♀	197. 0	89. 0	28. 5	20. 0
Do	♀	198. 0	93. 0	27. 5	19. 0
Do	♀	200. 0	93. 0	28. 5	19. 5
Do	♀	196. 0	88. 0	------	20. 0
Do	♀	195. 0	92. 0	27. 0	19. 0
Mount Kenia, 7,500 feet (2,200 meters)	♀	195. 0	89. 0	28. 5	19. 0
Morijo	♀	201. 5	95. 0	28. 5	18. 0
Morroshura	♀	197. 0	90. 0	29. 5	18. 5

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[13] Journ. f. Ornith., 1923, Sonderheft, pp. 72–73.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Kenya Colony—Continued.					
Fay's farm, 8,000 feet (2,400 meters)	♂	200. 0	95. 0	28. 0	19. 5
Mount Kenia, 10,700 feet (3,200 meters)	♂	206. 0	94. 0	29. 0	17. 0
Mount Kenia, 8,500 feet (2,550 meters)	♂	199. 0	89. 0	27. 0	19. 0
Do	♂	202. 0	95. 0	30. 0	19. 5
Do	♂	205. 0	87. 0		18. 0
Do	♂	200. 0	92. 5	31. 0	20. 5
Do	♂	200. 0	90. 0	30. 5	20. 0
Do	♂	198. 0	91. 0	30. 0	18. 0
Mweru	♂	207. 0	96. 0	29. 0	19. 5
Morijo	♂	204. 0	95. 0	29. 0	19. 0
Morroshura	♂	192. 0	93. 0	28. 5	19. 0
Lake Ngunga	♂	207. 0	96. 0	28. 0	19. 0
Upper Guari Nyaki		198. 0	90. 0	28. 0	18. 0
Do		197. 0	95. 0	28. 5	18. 5
Cameroon:					
Bitye	♀	200. 0	92. 0	31. 5	21. 0
Lakale	♀	207. 0	94. 0	34. 0	20. 5

Aside from the specimens collected, Mearns noted 40 of these parrots at Meru on August 9, 300 at Meru and Kilindini on August 10, and 200 at Escarpment, September 4–12.

POICEPHALUS FLAVIFRONS FLAVIFRONS (Rüppell)

Pionus flavifrons Rüppell, Syst. Uebers., pp. 81, 84, pl. 31, 1845: Shoa.

Specimens collected:

One male, Arussi Plateau, 9,200 feet (2,760 meters), Ethiopia, February 23, 1912.

One male, Botola, Sidamo, Ethiopia, March 5, 1912.

One male, two females, Aletta, Sidamo, Ethiopia, March 8–10, 1912.

One male, Ethiopia, March 2, 1912.

One female, immature, Loco, Ethiopia, March 13, 1912.

One male, Barka Forest, Ethiopia, November 5, 1904. (P. Zaphiro collection.)

The material available for study consists of 12 specimens, all of which are typical *flavifrons*. All but one are adult, and have bright yellow areas of variable extent on the front and sides of the head, usually surrounding the eye, and, in one male (U.S.N.M. 243667, Botola), extending backward from the eye upon the sides of the head and neck for a distance of 30 millimeters. Neumann[14] writes that some individuals have only the forehead and anterior part of the crown yellow, while others have the entire head this color. The older birds seem to have more yellow than younger ones. No specimen has any bluish color on the breast or rump as shown in Heuglin's plate of his *citreicapillus*[15] which Neumann[16] regards as either a species distinct from *P. flavifrons* or as a hybrid between it and *P. meyeri.*

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[14] Journ. f. Ornith., 1904, p. 375.

Reichenow[17] considered *Poicephalus crassus* Sharpe as the young of *flavifrons.* Neumann[18] showed that the type of *crassus* came from the lowlands of the Sudan whereas *flavifrons* is a highland bird and that obviously young birds of the latter species in his Abyssinian collection did not fit the description of *crassus* (said to have a brownish head). However, he did not describe his young birds which seems to imply that they resembled older ones more or less. Therefore it may be of value to describe the present immature specimen, which seems to be the only really juvenal one yet obtained. It is like the adults but has no bright yellow on the head. The forehead, anterior portion of the crown, lores, and cheeks are dull yellowish olive green; the rest of the head as in the adult but somewhat duller. Erlanger[19] writes that in young birds the head and neck are grayish brown with a greenish sheen; a statement possibly based more on Reichenow's mistaken conclusions about *crassus* than on any information new at that point. It is, however, applicable to *flavifrons*, but only rather crudely so.

Males average larger than females. Seven adult males measure as follows: Wing 166–174 (172), tail 80–87 (84.2), culmen from cere 24–26.5 (25.4) millimeters; while four adult females are as follows: Wing 163–166 (164.5), tail 73–78 (75), culmen from cere 14–15 (14.7) millimeters.

P. flavifrons has two distinct geographical forms, as follows:

1. *P. flavifrons flavifrons.*—Ethiopia, except western Shoa; that is, except the valley of the Sobat River south to the Djam-djam country.

2. *P. flavifrons aurantiiceps.*—Upper Sobat Valley. This form differs from the typical one in that it has the yellow of the head replaced by deep orange red.

This parrot is an inhabitant of the mountain forests of the Abyssinian highlands and is most numerous in the northern part of its range. In the southern parts of Shoa it is much less common, probably on account of the lower altitude and the ecological changes thereunto attendant. Neumann gives its altitudinal range as from

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[15] Orn. Nordost Afrika's, vol. 2, 1873, pl. 26.

[16] Nov. Zool., vol. 15, 1908, p. 382.

[17] Vög. Afrikas, vol. 2, p. 18.

[18] Nov. Zool., vol. 15, 1908, p. 376.

[19] Journ. f. Ornith., 1905, pp. 436–437.

1,000 to 3,000 meters (3,300 to 10,000 feet). Erlanger states that it breeds in holes in large trees, but does not give the season.

Mearns recorded the yellow-headed parrot as follows: Aletta, March 7–13, 10 birds seen; Loco, March 13–15, 4 seen. All the others seen were collected and are listed above.

POICEPHALUS RUFIVENTRIS RUFIVENTRIS (Rüppell)

Pionus rufiventris RÜPPELL, Syst. Uebers., 1845, p. 83, pl. 32: Shoa.

Specimens collected:

Five adult males, two adult females, one immature male, Dire Daoua, Ethiopia, December 6–21, 1911.

Two adult males, Moulu, Ethiopia, January 17, 1912.

One adult male, Sadi Malka, Ethiopia, January 28, 1912.

One adult male, Lake Abaya, southeast, Ethiopia, March 21, 1912.

Five adult males, seven adult females, Gato River near Gardula, 4,000 feet (1,200 meters) Ethiopia, April 6 to May 14, 1912.

Four adult males, one adult female, Sagon River, Ethiopia, May 19 to June 5, 1912.

One adult female, Er re re village, Kenya Colony, June 25, 1912.

One immature male, Tharaka district, 2,000 feet (600 meters), Kenya Colony, August 13, 1912.

One adult female, Tana River, between camps 2 and 3, Kenya Colony, August 16, 1912.

Soft parts: Iris, orange red, same color as breast; cere and bill, plumbeous black; feet, plumbeous; claws, black; naked eye ring, slaty black to livid plumbeous.

The immature and four of the adult males from Dire Daoua were collected by H. and F. von Zülow; all the other specimens by Mearns.

Besides the above listed 32 specimens, I have examined 14 others, or 46 in all. Unfortunately this series contains no examples from Somaliland (subspecies *pallidus*) but it does enable me to discuss the validity of *simplex*. Van Someren[20] writes that birds from the south of Ethiopia "* * * are separable from the northern or typical birds, and the name *simplex* which Reichenow applied to a female bird collected in Tanganyika Territory has rightly been reestablished." The only unfortunate part of this statement is that the southern birds are not separable from the Abyssinian ones. The history of this question is as follows. Reichenow[21] described a parrot from Tanganyika Territory under the name *Poicephalus*

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[20] Nov. Zool., vol. 29, 1922, pp. 46–47.

[21] Journ. f. Ornith., 1887, p. 55.

simplex, the type of which was subsequently found to be a female of *P. rufiventris.* Twenty-five years later Madarász[22] separated the birds of East Africa from those of Ethiopia and revived the name *simplex* for the former group and restricted *rufiventris* to the latter. Zedlitz, a few years later[23] corroborated Madarász's conclusions and stated that the best characters for identifying the two races are: (1) The bill which is relatively more slender in *rufiventris* and thicker, more swollen in *simplex;* and, (2) the coloration—*rufiventris* having darker upper parts, and in the female, the under parts being more bluish in *rufiventris*, more greenish yellow in *simplex.*

The present series has been carefully examined with these characters in mind, pains being taken to compare fresh plumages with fresh plumages, adults with adults, etc., as cautioned by Zedlitz. No appreciable or constant difference in the stoutness or slenderness of the bill can be noticed in birds from Kenya Colony (south to Taveta, whence Van Someren claims to have examples of *simplex*) and from Ethiopia (north to Dire Daoua, Sadi Malka, etc.). It is true that Abyssinian birds are slightly darker above, but while no examples from Kenya Colony are as dark as the darkest northern birds, many of the latter are no darker than the average southern type. The character of the color of the underparts in the female is exactly reversed by the present series. Where Zedlitz found that Abyssinian birds were more bluish below, I find this true of specimens from southern Kenya Colony (Taveta and the Guaso Nyiro) while Abyssinian females are more greenish or greenish yellow. It therefore follows that *simplex* can not be maintained as a recognizable race.

Van Someren not only recognizes *simplex* but also suggests that there may be still another (intermediate) form in southern Ethiopia, having the small bill of *rufiventris* but paler above and bluer on the rump, agreeing in this respect with *simplex.* Most of the series collected by Mearns would be of this intermediate form on geographical grounds alone, but inasmuch as *simplex* is not separable, it follows that an intermediate form would have even less to support it.

The measurements of the series studied by me are appended in tabular form as further evidence of the identity of *rufiventris* and *simplex.* The northern Somaliland form *pallidus* is upheld by Sclater[24] and is probably valid.

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[22] Orn. Monatsb., 1912, Heft 5, p. 80.

[23] Journ. f. Ornith., 1915, pp. 4–5.

[24] Syst. Avium Ethiop., 1924, p. 201.

Locality	Sex	Wing	Tail	Culmen from cere	Depth of maxilla at base	Width of maxilla at base	Tarsus
Ethiopia:							
Dire Daoua	♂ adult	149.0	76.0	20.0	13.0	14.5	17.0
Do	do	144.0	74.5	19.0	12.0	13.5	15.0
Do	do	148.5	81.0	23.0	14.0	14.0	17.5
Do	do	148.0	74.0	24.0	14.0	15.0	18.0
Do	do	148.0	76.0	24.0	14.0	15.0	16.0
Moulu	do	155.0	75.0	23.0	14.5	14.5	18.0
Do	do	146.0	76.0	22.5	13.0	14.5	18.5
Sadi Malka	do	154.0	76.0	24.5	14.0	14.5	17.5
Lake Abaya	do	143.0	71.0	25.0	15.0	16.0	16.0
Gato River	do	152.5	76.0	24.5	14.0	15.5	15.0
Do	do	157.0	74.0	24.5	14.0	16.0	18.0
Do	do	151.0	77.0	24.0	14.5	15.0	17.0
Do	do	152.0	83.0	24.5	14.5	15.5	17.0
Do	do	152.0	74.0	24.5	14.5	16.0	17.0
Sagon River	do	147.0	72.5	24.0	15.0	15.5	17.5
Do	do	151.0	73.0	25.0	15.0	15.0	19.0
Do	do	151.0	74.5	------	14.0	14.5	18.5
Do	do	152.0	81.5	24.0	15.0	15.5	19.0
Kenya Colony:							
45 miles north of Meru	do	148.5	74.0	24.5	14.5	15.5	18.0
Do	do	150.5	80.0	24.5	14.0	15.5	18.5
Do	do	148.0	74.0	------	14.5	15.5	17.5
Nyiro and Meru Rivers	do	143.0	72.5	24.5	14.0	15.0	17.5
Guaso Nyiro	do	158.0	80.5	25.0	15.0	16.0	17.5
Tana River	do	143.5	72.0	22.5	14.0	16.0	16.0
20 miles northeast of Chuka.	do	154.0	74.0	24.0	14.0	15.0	17.5
Taveta	do	151.5	76.0	25.0	15.0	15.5	17.0
Ethiopia:							
Dire Daoua	♀ adult	144.0	78.0	20.0	12.0	13.0	17.0
Do	do	142.0	76.0	21.0	12.0	13.0	16.0
Gato River	do	145.0	77.5	22.0	12.0	14.5	16.5
Do	do	144.0	71.5	22.0	13.0	14.0	17.0
Do	do	147.0	73.0	21.5	13.0	14.0	17.5
Do	do	148.0	76.5	22.0	13.0	13.5	18.0
Do	do	145.0	74.0	20.0	13.0	13.5	17.5
Do	do	144.0	72.0	22.0	12.5	14.0	17.0
Do	do	149.0	77.0	22.0	12.5	13.0	19.0
Sagon River	do	145.0	77.0	21.0	13.0	14.0	17.0
Kenya Colony:							
Er re re village	do	149.0	74.0	23.0	13.0	13.5	17.0
Tana River	do	143.5	67.5	------	14.0	14.0	17.5
Marsabit Road	do	145.0	75.0	22.0	13.5	15.0	18.0
Guaso Nyiro	do	144.0	76.5	22.5	13.5	14.0	17.0
Do	do	143.0	78.0	21.5	13.5	14.5	15.5
Taveta	do	152.0	80.0	22.0	13.0	14.5	15.5

There is still much to be learned about the plumages of this parrot in spite of the fact that it is a common bird in collections. An immature male from Tharaka district, Kenya Colony (U.S.N.M. 243697), resembles adults except that the abdomen is pinkish flesh ocher instead of deep orange red and the upper parts are lighter, more brownish, less fuscous. This plumage is succeeded by the adult type, the molt beginning on the under parts and then spreading to the back and head. A male taken on April 6 on the Gato River is in this molt. The under parts are new, the upper parts, a mixture of light earth brown (immature) feathers and darker, adult ones. The amount of pale reddish brown on the throat and breast seems to increase with age as does also the dull bluish-green sheen on the upper parts, according to Erlanger.[25] However, while the present series seems to confirm this in a general way, it is noteworthy that the immature male from Tharaka has both these characters well developed. It seems, therefore, better to put the matter in a slightly different way, that the dull bluish-green margins of the feathers of the upper back increase in width with age, and the color is therefore more noticeable and persists even in worn birds, while the gray margins of the throat and breast feathers become successively narrower with each molt, thereby rendering the subterminal rufescent areas more and more visible.

The red-bellied parrot occurs from central Ethiopia (Dire Daoua, Sadi Malka, etc.) through Shoa, Arussiland, Gallaland, Somaliland, and Kenya Colony to the Pangani River in Tanganyika Territory. The birds of northern Somaliland are considered subspecifically distinct (*pallidus*). The species lives in the Acacia-Mimosa bushveldt, and is therefore absent in the highlands of Ethiopia. In that country it is found in the valleys, lowlands, and, more widely, in the southern districts where the altitudes are lower. Erlanger[25] writes that it breeds in holes in termite mounds in Ethiopia (on trees in East Africa according to Schillings) and that the breeding season is during May and June. Zedlitz[26] writes that as this bird is a fruit eater it would seem logical to assume that its breeding season would not come during the height of the rainy season as Erlanger's data would indicate, but that it would be some weeks or months later when the fruit was ripe.

Mearns observed the red-bellied parrot on the following occasions: Errer to Gada Bourca, commonly seen and heard; Dire Daoua, common; Hawash River, everywhere, but not numerous; Abaya Lakes, March 19–26, 9 seen; Gato River, March 29 to May 17, 200; Bodessa and Sagon River, May 19 to June 6, 162; Tertale, June 7–12, 4 birds; Turturo, June 15–17, 20 seen; Wobok, June 18, 20; near Saru, June 19, 20 birds; Yebo, June 20, 10 recorded; Karsa Barecha, June 21, 50; Chaffa villages, June 22–23, 30 seen; Northern Guaso Nyiro River, July 31 to August 3, 14 birds; Tharaka district, August 13, 20 seen; Tana River, August 14–17, 90; junction of Tana and Thika Rivers, August 23–26, 6 birds seen.

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[25] Journ. f. Ornith., 1905, p. 438.

[26] Idem, 1915, p. 5.

AGAPORNIS TARANTA (Stanley)

Psittacus taranta Stanley, in Salt's Travels Abyss., App. p. lii, 1814: Pass of Taranta, inland from Massowa.

Specimens collected:

One female adult, Ourso, Ethiopia, October 5, 1911.

Five male, three female adults, Arussi Plateau, 9,000 feet (2,700 meters), Ethiopia, February 22–29, 1912.

One male, two female adults, Cofali, Ethiopia, March 2–3, 1912.

Two males, Botola, Sidamo, Ethiopia, March 4, 1912.

One male, Loco, Ethiopia, March 15, 1912.

A series of 134 specimens examined reveals no constant geographic variations. Taking into consideration only adult birds, the size variations are as follows:

Males: Wing, 95–108 (average 103.1); tail, 44.5–55 (47.7); culmen from cere, 15.5–18.5 (17.2) millimeters.

Females: Wing, 94–105 (average 101.8); tail, 44–50 (46.7); culmen from cere, 15–18 (17.2) millimeters.

Neunzig[27] gives the wing length of *A. taranta* as 100 to 110 millimeters.

In coloration, birds vary from deep, bright green to bright yellowish olive green on the occiput, nape, and back; while in adult males, the forehead varies from scarlet to orange scarlet. The red forehead is found only in adult males, that of the female being green like the rest of the head. Likewise the female lacks the red eye ring present in the males. Strangely enough, many writers have wrongly assumed that both sexes had red foreheads as adults, and Reichenow[28] even says that in the females the red color is paler and yellower than in males. However, as far back as 1870 Blanford[29] wrote that "the male alone has a red head." In 1905 Erlanger[30] also showed it to be a sexual character.

In his recent review of the genus *Agapornis*, Neunzig[27] states the range of *taranta* to comprise the mountainous country of central and southern Ethiopia from the Mareb River south to Djam-djam and Dobo, southwest to Gimirrha, in the west to Kaffa, and southeast to Harrar. This is taken from Neumann's account.[31] Sclater[32] gives substantially the same. Both seem to have overlooked the fact that Zedlitz[33] recorded this species from the Asmara plateau, in Eritrea, well over 100 kilometers north of the Mareb River.

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[27] Verh. Orn. Ges. Bay., vol. 17, 1926, p. 114.

[28] Vög. Afr., vol. 2, p. 21.

[29] Geol. and Zool. Abyss., p. 304.

[30] Journ. f. Ornith., vol. 53, p. 438.

[31] Nov. Zool., vol. 15, 1908, p. 387.

[32] Syst. Avium Ethiop., 1924, p. 204.

[33] Journ. f. Ornith., 1910, p. 738.

Furthermore Von Heuglin reported the bird from Mensa and Tsad-Amba on the Anseba River, and Reichenow[28] duly mentioned these localities which are also north of the Mareb. The southern limits of the range as given by Neunzig are correct as far as known. *Agapornis taranta* is a highland bird, occurring at altitudes of from 4,500 to 10,500 feet (1,350 to 3,150 meters). Blanford never saw it below 7,000 feet (2,100 meters) and recorded it as very local, being particularly numerous near Adigrat. Von Heuglin met with it in groups of from pairs or single families to as many as 80 birds, chiefly in tall trees such as junipers, but in the candelabra euphorbias as well. Erlanger noted it in the luxuriant valleys in the highlands of Shoa, in the forests, the taller euphorbias, and even in the cultivated areas of the Gallas.

Little is known of the breeding season. Blanford writes that his collector obtained an egg in April, "* * * which he assured me belonged to this bird, from a hole in a tree, and there can be little doubt of its having been correctly identified." On the basis of his observations of the pairing of these birds, and the fact that the members of each pair seemed loath to leave each other, Zedlitz concluded that the breeding season began in the summer when fruits and seeds were most available. This last is somewhat confused, and, inasmuch as many parrots are known to mate for life, Zedlitz's observations are, in themselves, no very reliable index of the breeding time.

Order STRIGIFORMES

Family TYTONIDAE

TYTO ALBA AFFINIS (Blyth)

Strix affinis BLYTH. Ibis, 1862, p. 388: Cape of Good Hope.

Although Mearns did not collect any barn owls, he recorded seeing one in the Indunumara Mountains, July 14–18, and another 27 miles south of Malele, July 29.

Family STRIGIDAE

OTUS SCOPS PULCHELLUS (Pallas)

Stryx pulchella PALLAS, Reise versch. Prov. Russ. Reichs, vol. 1, p. 456, 1771: Volga River, South Russia.

Specimens collected:
Male, Moulu, Ethiopia, December 17, 1911.

Only two races of the European scops owl migrate to Africa, where they occur in winter as far south as northern Uganda, the typical race and the present one. *O. s. pulchellus* may be told from typical *O. s. scops* by the grayer color (often with many white spots on the upper parts) and the longer wing of the former. However, the wing lengths overlap to a great extent, the figures given by Hartert[34] being *scops*, male 144–160 and female 148–162 millimeters (50 specimens); *pulchellus*, male 151–164 and female 156–163 millimeters (12 specimens). The present specimen has a wing length of 157.5 millimeters and might therefore be identified as either, but it is grayer in color than any of a series of 11 *scops* examined, so I refer it to *pulchellus*. Meinertzhagen[35] claims that *pulchellus* is not recognizable.

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[28] Vög. Afr., vol. 2, p. 21.

While *Otus scops* has been previously recorded as a winter visitor from the north in Ethiopia, all previous records have been recorded binomially as *Otus scops*, and no attempt has been made to identify them beyond this stage. This may mean that all previous records were of the typical race, or that the authors responsible for them did not recognize the validity of *pulchellus*. Sclater and Mackworth-Praed[36] list both races from the Anglo-Egyptian Sudan, and it seems likely that both forms occur in Ethiopia as well. If anything, the chances of finding them there are greater than farther north, as *pulchellus* appears to follow a migration route along the eastern side of the Red Sea and then turns west through Somaliland and across to the Sudan. For that matter, the typical race must have some similar route, as it is very rare in Egypt. Koenig[37] writes that in all his many years of wanderings and studies in Egypt he never saw *Otus scops*, although he heard what he thought was it on one occasion. On the other hand, Von Heuglin reported it as a migrant in autumn, winter, and spring in Egypt, south to Sennar and Ethiopia; Vierthaler saw a group of from 15 to 20 on the Blue Nile on January 25. Sclater[38] records *pulchellus* from Muscat and southwestern Arabia, facts which further suggest a migration route largely to the east of Egypt. The typical form apparently migrates south by way of Gibraltar, as well as on the eastern side of Africa, and its winter range is correspondingly broader (Senegal to Ethiopia) than that of *pulchellus* (Arabia to the Anglo-Egyptian Sudan).

Erlanger[39] procured a male (wing 154 millimeters) at Tumadu, Djam-djam district, Ethiopia, on December 24. To which race his specimen belongs, I can not say.

According to the authors of the Practical Handbook of British Birds (p. 89, writing of the typical form), "* * * * specimens from Africa in January and February are moulting body, wings, and tail, but * * * this is nearly complete in January * * *." Lest it be assumed that a similar molting season holds for *pulchellus* it may be stated that the present specimen (collected December 17 is in fresh plumage, the only signs of molt being on the lower breast. The wings and tail feathers are fresh and full grown. It would therefore appear that *pulchellus* molts earlier than *scops*, a thing which (if found true in additional cases) suggests that the whole life cycle of *pulchellus* may be a month earlier than that of *scops*, and that the two races are thus isolated physiologically as well as geographically.

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[34] Vög. pal. Fauna, vol. 2, pp. 980–981.

[35] Ibis, 1922, p. 55.

[36] Idem, 1919, p. 680.

[37] Journ. f. Ornith., vol. 65, vol. 2, 1917, pp. 146–148.

[38] Syst. Avium Ethiop., 1924, p. 241.

[39] Journ. f. Ornith., 1904, pp. 234–235.

OTUS SENEGALENSIS CAECUS Friedmann

Otus senegalensis caecus FRIEDMANN, Auk, 1929, p. 521: Sadi Malka, Ethiopia.

Specimens collected:
Female, Dire Daoua, Ethiopia, November 30, 1911.
Male, Dire Daoua, Ethiopia, December 9, 1911.
Female, Sadi Malka, Ethiopia, February 1, 1912.

The Sadi Malka bird is the type of this subspecies.

As has been pointed out in a previous publication [40] this form of the scops owl is the darkest, most heavily vermiculated one of the species. Sclater,[41] Hartert,[42] and others have maintained that it is impossible to recognize any races of this owl on the mainland of Africa, although admitting that the variations are very great. The series available in any one museum is usually inadequate and contains no considerable number of birds from any one locality, and it is consequently difficult to determine if the individual is greater than the geographical variation or not. However, the evidence points to the conclusion that geographic variation exceeds individual differences, and, while difficult to make out at times, several races are justifiable. I recognize the following:

1. *Otus senegalensis senegalensis.*—Senegal, Gambia, Gold Coast, and western Sudan.

2. *Otus senegalensis ugandae.*—The Bahr el Ghazal district of the Sudan, the northeastern Belgian Congo, the Kivu district, Ruanda, northwestern Tanganyika Territory, and extreme western Kenya Colony.

3. *Otus senegalensis pygmaea.*—Of this form which occurs in the Tacazzé district, Sennar, and the Blue Nile, I am not certain as I have not been able to compare it with typical *senegalensis*, but I suspect that it is valid.

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[40] Friedmann, Auk, 1929, p. 521.
[41] Syst. Avium Ethiop., 1924, p. 241.
[42] Nov. Zool., vol. 31, 1924, p. 18.

4. *Otus senegalensis caecus.*—Ethiopia and Kenya Colony, south to the Northern Guaso Nyiro River.

5. *Otus senegalensis socotrana.*—The island of Socotra.

6. *Otus senegalensis feae.*—Annobon Island.

7. *Otus senegalensis hendersoni.*—Angola to the Katanga and Northern Rhodesia.

8. *Otus senegalensis pusilla.*—Boror to Beira, Mozambique.

9. *Otus senegalensis latipennis.*—South Africa. I have seen no material wherewith to judge the validity of *intermedia* Roberts and *grisea* Roberts, and therefore lump them with *latipennis*, at least for the present. They may, however, be perfectly recognizable.

I have seen no *socotrana* or *feae*, but there seems to be no dispute as to their validity.

As elsewhere shown,[40] Madarász's name *königseggi* is a synonym of *pygmaea* of Brehm.

As was first indicated by Zedlitz [43] the birds of the Tacazzé district, Sennar, and west of the Ethiopian highlands, are much lighter than those found in eastern, central, and southern Ethiopia. The former group are what are here called *pygmaea*, the latter *caecus*.

According to Erlanger [44] this owl is by no means an uncommon bird in northeastern Africa, but because of its nocturnal habits, it is seldom observed. The breeding season appears to be very prolonged and irregular, as Erlanger collected males with greatly enlarged testes in November in southern Shoa, while Hilgert found an incubating female on its eggs on April 3.

CARINE NOCTUA SOMALIENSIS (Reichenow)

Athene spilogaster somaliensis Reichenow, Vög. Afr., vol. 3, p. 822, 1905: Somaliland.

Two unsexed, Dire Daoua, Ethiopia, September 1, 1911.

Male and female, Dire Daoua, Ethiopia, December 19–20, 1911.

These four specimens appear to be the first recorded from Ethiopia and extend the known range of this bird westward for about 200 miles. They agree perfectly with a specimen from Gelloker, British Somaliland (February 15, 1899), and are therefore not to be considered as intermediate between *somaliensis* and *spilogaster* (of which latter form I have unfortunately seen no material).

The female has some of the crown feathers white medially, while the male has none with any white, but a few with lighter tawny centers.

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[40] Friedmann, Auk, 1929, p. 521.

[43] Journ. f. Ornith., 1910, p. 734.

[44] Idem, 1904, p. 235.

This species is chiefly Palearctic in distribution, but extends into northeastern Africa (Eritrea, eastern Sudan, Ethiopia, and Somaliland) where it is represented by two races, as follows:

1. *C. n. spilogaster.*—Characterized by having the top of the head fairly distinctly striped, the color of the upper parts somewhat lighter, and the wings and tail longer than in *somaliensis.* This race occurs in the Eritrean coastlands from about Annesley Bay north to the Red Sea Province of the Sudan.

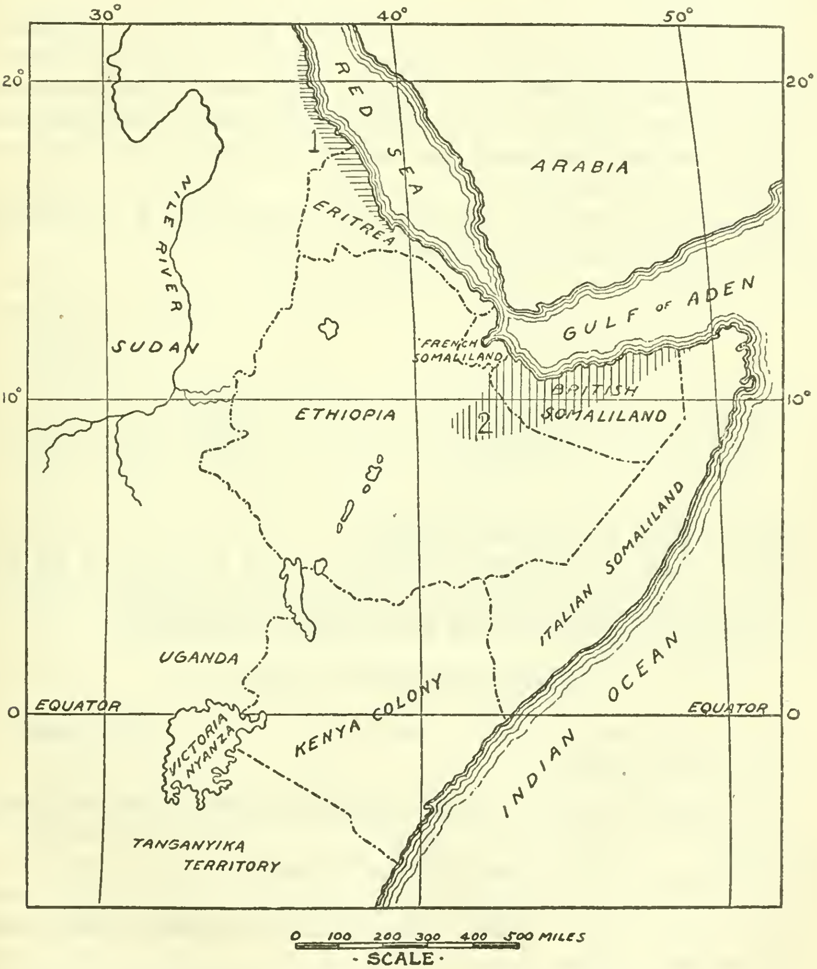

FIGURE 8.—DISTRIBUTION OF CARINE NOCTUA IN NORTHEASTERN AFRICA: 1, CARINE NOCTUA SPILOGASTER; 2, CARINE NOCTUA SOMALIENSIS

2. *C. n. somaliensis.*—Darker above, shorter wings and tail than in *spilogaster*, and crown more or less flecked or spotted with light tawny or whitish, but not streaked; found in northern Somaliland west through the Hawash region of Ethiopia to Dire Daoua.

As long ago as 1895, Sharpe,[45] when reporting on the birds collected by Donaldson Smith in Somaliland, noted that the Somali birds were darker than the figure given by Von Heuglin for *spilogaster*[46] and that the rufous streaks on the underparts were broader than in the latter. He did not attempt to separate them, however, but it is very clear that the birds he had were *somaliensis* and not *spilogaster.*

But little has been recorded of the habits of this owl. It apparently lives in fairly open country where termite mounds are found, as both Hawker[47] and Shelley[48] record that it breeds in holes in these mounds. Lort Phillips[49] found it to be common, as did both the other writers just mentioned, but found it breeding in hollow trees as well as in white-ant hills.

Inasmuch as this bird is rather rare in collections, I append the measurements of the three sexed specimens seen.

Locality	Sex	Wing	Tail	Culmen from cere
Ethiopia, Dire Daoua	♂	136. 0	65	12. 5
Do	♀	135. 0	64	12. 0
British Somaliland, Gelloker	♀	131. 5	62	12. 5

All the birds are in fresh plumage.

These measurements agree fairly well with those given by Erlanger[50] except that his figures for the culmen are slightly larger as are also those for the tail, but the difference is not great.

GLAUCIDIUM PERLATUM (Vieillot)

Strix perlata Vieillot, N. Dict. d'Hist. Nat., vol. 7, p. 26, 1817: Senegal.

Specimens collected:

Two females, Gato River near Gardula, Ethiopia, April 16 to May 13, 1912.

One female, Yebo, Ethiopia, June 21, 1912.

Soft parts: Eyelid, black; cere and bill, greenish yellow; bare chin and toes yellow.

A careful study of the plumage variations of this owl and a survey of the literature have convinced me that it is not possible to correlate any variations with geography and consequently I do not recognize any subspecies of *Glaucidium perlatum.* This conclusion was also reached by Claude Grant[51] and by Sclater and Mackworth-Praed[52] and others, while Erlanger[53] and Van Someren[54] have argued in favor of two or even three races. Van Someren's argument I can not follow at all. He writes that there is a western form and an eastern race, but that East African birds are intermediate.

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[45] Proc. Zool. Soc. Lond., p. 504.

[46] Orn. Nordost Afr., vol. 1, pl. 4, 1869.

[47] Ibis, 1899, p. 77.

[48] Idem, 1885, p. 392.

[49] Idem, 1898, p. 418.

[50] Journ. f. Ornith., 1904, pp. 238–239.

At first sight it seemed as though the present three birds represented a dark, quite distinct race, as they are noticeably darker, especially on the ventral stripes, than any of a series of nine from Kenya Colony, Tanganyika Territory, South Africa, and Damaraland, but Erlanger[53] noted that his birds from the same region agreed with others from equatorial East Africa. Furthermore the present three skins are somewhat compressed, thereby tending to intensify the coloration, and are also grease burned, and still further, it must be remembered that owls are notoriously variable in coloration.

The most striking variation as one looks over a series of specimens is the presence or absence of whitish spots on the head. Claude Grant[51] suggested that unspotted birds were young and that the white spots were acquired later. Lynes[55] found he could safely confirm Grant's provisional conclusion as he procured young birds from several family groups. The bird collected by Mearns on May 13 at Gato River is then a young bird as it has the whole crown, occiput, and mantle plain, only the forehead being spotted. The Yebo specimen is slightly older as there are a few spots on the crown and several on the mantle, and the forehead is spotted as in the first mentioned bird. The other Gato River specimen (April 16) is an adult.

In some adults the spots on the crown are elongated into small bars, but this is purely an individual variation.

It does not appear to be generally recognized that this owl is dichromatic but such seems to be the case. The two phases, gray and rufous, are less distinct than in many other owls, but yet are quite obvious upon careful study.

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[51] Ibis, 1915, p. 256.

[52] Idem, 1919, pp. 681–682.

[53] Journ. f. Ornith., 1904, pp. 240–241.

[54] Nov. Zool., vol. 29, 1922, p. 46.

[55] Ibis, 1925, p. 391.

The size variations of this owl are indicated in the following table:

Locality	Sex	Wing	Tail	Culmen from cere
Ethiopia:				
Gato River	♀	107. 5	75. 0	12. 0
Do	♀	103. 0	68. 5	11. 5
Yebo	♀	104. 0	74. 5	12. 0
Kenya Colony, Ithanga Hills	♀	109. 0	76. 0	13. 0
Kenya Colony, 20 miles north of Meru	♀	107. 5	72. 5	11. 0
Tanganyika Territory, Dodoma	♀	107. 0	76. 5	12. 0
Do	♀	105. 0	--------	11. 5
Damarland	♀	106. 0	70. 5	12. 0
Tanganyika Territory, Dar es Salaam	♂	105. 0	73. 5	12. 0
Kenya Colony (latitude 0° 8′ N., longitude 38° 45′ E.)	♂	100. 0	71. 5	12. 0
Kenya Colony, Guaso Nyiro	------	100. 0	70. 0	12. 0
South Africa	------	108. 5	70. 0	11. 0

Sclater[56] gives the range of this bird as from Senegal and Sennar southwards. Its northern boundary extends considerably to the east of Sennar as the work of Von Heuglin, Finsch, Antinori, and others, has shown it to go as far as Bogosland and the Beni-Amer region, while Blanford[57] procured it in Eritrea and extreme northeastern Ethiopia at Mayen in the Senafé pass at about 3,500 feet, and in the Anseba valley. It occurs in wooded regions up to about 8,000 feet.

All observers agree that this species is largely diurnal in its habits. The bird procured at Gato River on April 16 was flying about in bright sunlight.

According to Lynes[55] the breeding season in Darfur is spring and early summer; the complete postnuptial molt taking place toward the end of summer. A female (Mus. Comp. Zoöl. 95375) from Dodoma, central Tanganyika Territory, collected on April 7, is molting all the tail feathers, so there may be some variation in molting (and hence probably also of breeding) season in different parts of Africa.

BUBO AFRICANUS CINERASCENS Guérin Méneville

Bubo cinerascens GUÉRIN-MÉNEVILLE, Rev. Zool., 1843, p. 321: Ethiopia.

Specimens collected:

Female, Spring in Indunumara Mountains, Kenya Colony, July 18, 1912.

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[55] Ibis, 1915, p. 391.

[56] Syst. Avium Ethiop., 1924, p. 244.

[57] Geol. and Zool. Abyss., 1870, p. 303.

The single specimen collected agrees with others from the Blue and White Niles and with the type specimen. The type is somewhat faded, but if due allowance be made for this, no important differences between it and the other examples mentioned can be discerned.

Sclater[58] lists three races of *Bubo africanus.* I have seen material of but two of these, but judging from the trend of the literature it would appear that Sclater's arrangement is substantially sound. The three races are as follows:

1. *B. a. africanus.*—South Africa north to Angola, the Belgian Congo, Nyasaland, and Tanganyika Territory, to Kenya Colony and Uganda. In the latter two countries it merges into *cinerascens*, but the intergradation is so gradual that it is quite difficult to tell where one ends and the other begins. Thus, for example, Lönnberg[59] records *cinerascens* from the thornbush country north of Guaso Nyiro, below Chanler Falls. The single specimen obtained was small (wing 302 millimeters), although a female, and therefore was identified as belonging to the northern race. On the other hand, Van Someren[60] records the typical subspecies from Nairobi and Nakuru, and does not mention *cinerascens* from south of the Kerio River and southern Turkanaland in Uganda.

2. *B. a. cinerascens.*—Sierra Leone to Nigeria east through the Upper Guinean savannah region through the Sudan to Ethiopia, Eritrea, Somaliland, and northern Uganda and Kenya Colony, merging with *africanus* in the last two. According to Van Someren[60] *cinerascens* occurs in the Suk country and the West Nile Province of Uganda.

This race differs from *africanus* in being smaller (wing 290–325 millimeters as against 325 to 360 millimeters in the typical race). Claude Grant[61] writes that *Asio maculatus amerimnus* Oberholser (not *americanus* as he misquotes it) appears to be a synonym of *cinerascens.* The type of *amerimnus* came from Durban, Natal, so it must be considered a pure synonym of *africanus.* Doctor Abbott collected one bird, referred to *amerimnus* by Oberholser, on Mount Kilimanjaro. Apparently Grant mistook this bird to be the type, but even there he is wrong in considering it the same as *cinerascens.*

3. *B. a. milesi.*—Southern Arabia. This race I have not seen, but according to Reichenow[62] it resembles *cinerascens* but has the upperparts and underparts washed with rusty yellow.

The spotted eagle owl is widely distributed in the region covered by the present report, being found in a great variety of ecological habitats. Thus, Blanford[63] found a pair on a rocky cliff; Erlanger[64] found the species numerous in the vicinity of the periodic stream beds in Somaliland as well as in thick bush country, Euphorbia and Acacia tangles, and the more luxuriant vegetation of southern Gallaland. It does not seem to occur in the highlands, its altitudinal limit being about 5,500 feet.

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[58] Syst. Avium Ethiop., 1924, pp. 245–246.

[59] Kungl. Sv. Vet. Akad. Handlgr., vol. 47, 1911, p. 60.

[60] Nov. Zool., vol. 28, 1922, p. 45.

[61] Ibis, 1915, p. 252.

[62] Vög. Afr., vol. 1, p. 657.

This owl, like so many of its genus, is somewhat dichromatic but the two phases, reddish and grayish, are less distinct than in some other species. Neumann[65] wrote that males were reddish while females were grayer. Two years later[66] he said that this was a mistake, the reddish birds being the females. Zedlitz[67] noted Neumann's first statement and, apparently overlooking the second one, produced independent evidence to the effect that females tended to be more reddish than males. The material of *cinerascens* that I have examined shows no dichromatism as all are grayish birds (four males and 1 unsexed, [type]), but the typical race is certainly dichromatic and the phases can not be correlated with sex.

According to Lynes[68] this species breeds in the spring and early summer in Darfur and the postnuptial molt occurs in autumn.

The specimen collected by Mearns had been feeding on some very large beetles, several of which were found in its stomach.

BUBO LACTEUS (Temminck)

Strix lactea TEMMINCK, Pl. Col., livr. 1, vol. 2, pl. 4, 1820: Senegal.

Specimens collected:

Male, Cofali, Ethiopia, March 2, 1912.

Two males and one female, Gato River near Gardula, Ethiopia, April 6–28, 1912.

Soft parts: Iris, hazel; cere, greenish gray; bill, greenish white; toes, pale greenish gray; claws, greenish brown, black at the tip.

I have examined a series of 13 specimens from Ethiopia, Kenya Colony, Tanganyika Territory, Uganda, and South Africa, and can find no differences between them. Considering the enormous range of this species (Senegal to Ethiopia and Bogosland, south to the Cape of Good Hope) and the well-known variability of owls in general, it is rather surprising to find no constant geographic forms. Furthermore, the absence of recognizable races is not due to unsually excessive nongeographic variations which might make subspecific demarcations difficult. Apparently this owl is an exception to the rule so characteristic of most of its relatives. Still, it should be noted that according to Reichenow,[69] South African specimens average larger than more northern ones. This notion is modified by Erlanger [70] who, on the other hand, states that southern birds, particularly southwestern ones (Damaraland, etc.), are generally lighter in color than East African examples, but that the difference is very slight at best. I can not see any difference between South and East African birds.

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[63] Geol. and Zool. Abyss., 1870, p. 302.

[64] Journ. f. Ornith., 1904, pp. 228–229.

[65] Bull. Brit. Ornith. Cl., vol. 12, 1902, p. 74.

[66] Journ. f. Ornith., 1904, p. 373.

[67] Idem, 1910, pp. 733–734.

[68] Ibis, 1925, p. 388.

This species is essentially a woodland bird and consequently is more local in its distribution than *Bubo africanus*.

Little is known of the breeding season of this bird in northeastern Africa. Lynes [71] found two fluffy young, recently out of the nest, with one parent bird on July 18 in Darfur, and writes that there "* * * is likely to be a good deal of variation in breeding period, for on January 18, 1914, we had a nest with two fresh eggs at latitude 12° (White Nile). These were in an old kite's nest, 25 feet up an acacia tree." In the collections of the Museum of Comparative Zoölogy there is an immature male, about three-quarters grown, taken on March 27, 1926, at Dembecha, 95 miles south of Lake Tsana, Ethiopia (Cheesman collection). This bird differs from the adults in having all the upper and underparts (with the exception of the remiges and rectrices) finely barred with grayish white and dull grayish earth brown. The loreal bristles are black as in the adults, the cheeks and auriculars broadly tipped with blackish. All the remiges and rectrices are new and not fully grown, their bases still encased within the sheaths. It appears, from the admittedly inadequate material available, that the adult plumage succeeds the juvenal stage so that year-old birds are indistinguishable from older ones.

Aside from the specimens collected, this owl was observed as follows: Northern Guaso Nyiro River, July 31 to August 3, two seen; Lekiundu River, August 4–8, four noted.

Order CAPRIMULGIFORMES

Family CAPRIMULGIDAE

CAPRIMULGUS STELLATUS STELLATUS Blundell and Lovat

Caprimulgus stellatus W. Blundell and Lovat, Bull. Brit. Orn. Cl., vol. 10, p. xxi, 1898: Kassim River, Southern Ethiopia.

Specimens collected:

Male and female, Iron Bridge, Hawash River, Ethiopia, February 5, 1912.

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[69] Vög. Afr., vol. 1, p. 651.

[70] Journ. f. Ornith., 1904, p. 227.

[71] Ibis, 1925, p. 389.

These two birds were a mated pair according to Colonel Mearns' notes.

This nightjar is a rather rare bird in collections and the inference that it is probably quite local in its distribution may not be out of place. Erlanger, Neumann, Zedlitz, and others failed to find it on their respective expeditions, to say nothing of their predecessors in Ethiopian ornithology such as Von Heuglin, Rüppell, Antinori, Jesse, Blanford, etc.

Two races are currently recognized—the typical one occurring from the Hawash district east to Gallaland and Somaliland, and a browner, less obviously spotted form, *simplex*, in the southern Shoan lake region. Lönnberg[72] records a specimen from the Acacia country near the Lekiundu River, just south of the Northern Guaso Nyiro, in Kenya Colony. This is the southernmost record for the species, but unfortunately he records it binomially as *Caprimulgus stellatus* so it is impossible to tell which race it represents. However, in answer to my inquiry, Professor Lönnberg writes as follows:

> * * * The differences on which Neumann appears to lay most importance are: "düster rötlicher nicht graue grundfarbe, schwarze and gelbe flecke der Flügeldecken fehlen." Regarding the colour of my specimen, it can not be called gray, nor reddish, but it has a suffusion of cinnamon. The wing coverts display a great number of rather large buff spots partly margined with black. If absence of spots on the wing coverts is an essential characteristic of *simplex*, my specimen from Lekiundu can not be referred to that race. It might, however, be possible that it represents a third race.

It thus appears that the Lekiundu bird agrees with *simplex* in color, but more with *stellatus* in its spotting. It is hardly worthy of nomenclatural recognition, and seems, to me at least, near enough to *simplex* to tentatively place it with that race.

It is the southernmost record for the species.

The present specimens (which are the only ones I have seen) are much darker, more brownish, less grayish, than the colored plate[73] of the type. Their measurements are as follows: Male—wing 155, tail 108, culmen 12; female—wing 146.5, tail 101, culmen 11 millimeters. Both are in fairly worn plumage. The female is similar to the male except in that the tips of the outer rectrices are white in the latter, while in the former only the basal part of the tip of the inner web is white, the rest being buffy, mottled with dark earth brown. Also the abdominal bars are darker and the dark bars on the tail feathers broader in the male than in the female. Whether this is individual or not I can not say with the present insufficient material.

Nothing is known of the habits of this bird.

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[72] Kungl. Sv. Vet. Akad. Handlgr., vol. 47, no. 5, 1911, p. 78.

[73] Ibis, 1900, pl. 4.

CAPRIMULGUS RUFIGENA FRAENATUS Salvadori

Caprimulgus fraenatus Salvadori, Ann. Mus. Civ. Genova, vol. 21, p. 118, 1884: Daimbi, Shoa.

Specimens collected:

Female, Bodessa, Ethiopia, June 3, 1912.
"Female" [male ?], Turturo, Ethiopia, June 16, 1912.

The Turturo specimen has the outer tail feathers broadly tipped with white and is therefore probably a male, although originally labeled "female."

I have not sufficient material to decide the point, but I rather suspect that Sclater's arrangement of the races of *C. rufigena* and *C. pectoralis*[74] is incorrect. It seems to me more logical and natural to call *fraenatus* and *ugandae* races of *pectoralis* and to entirely restrict *rufigena* to Africa south of the Zambesi River. However, until better series, particularly of *pectoralis*, are available, I prefer to adhere to Sclater's system, but if the above suspicion should be substantiated the races would stand as follows:

1. *C. pectoralis pectoralis.*—South Africa.
2. *C. pectoralis guttifer.*—Usambara Mountains, Tanganyika Territory.
3. *C. pectoralis fraenatus.*—Shoa to southern Kenya Colony.
4. *C. pectoralis ugandae.*—Probably not distinct from the preceding; only known from Mujenje, Uganda.
5. *C. rufigena.*—South Africa and Southern Rhodesia.

One is led to wonder if it may not be that *guttifer* and *fraenatus* are identical, but on the other hand, it is not likely that Grote, working with the rich material in the Berlin Museum would have overlooked *fraenatus* when identifying and describing the type of *guttifer.* Furthermore, the type (and only known specimen) of *guttifer* is said to be probably a female. Whether this is intended to be taken to mean that the sexes are alike in having white tips to the outer rectrices (and thereby agree with *pectoralis* and not with *rufigena*) is not clear, but since only one specimen is known (and that one unsexed), such an assumption is hardly justified.

Doctor Van Someren[75] described a new species *C. keniensis* from Mount Kenia, said to superficially resemble, "* * * *C. fraenatus*, but very dark with much bigger and more numerous dark buffy tips to the wing coverts * * *" etc. Hartert[76] writes of this type as follows: "The alleged 'more numerous' and larger spots on the wing coverts are not different from several other true

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[74] Syst. Avium Ethiop., 1924, pp. 248–249.

[75] Nov. Zool., vol. 29. 1922, p. 84.

[76] Idem, vol. 29, 1922, p. 401.

fraenatus, but the bird is darker on the upper side and chest; the shafts have a white line in front of the white patches, within which it is partially black. This coloration of the shafts is exceptional, but may possibly be an aberrant character. Otherwise the form might be a subspecies of *fraenatus*, but it was rash to describe it." I doubt that *keniensis* can be maintained, but whether it is identical with *fraenatus* or with *guttifer* is a question. Only a comparison of the types can give the answer. It would not be surprising if *keniensis* and *guttifer* were found to be the same—forming a mountain race in East Africa.

Another point that presents some puzzling aspects is Lynes's note on *C. rufigena* (?) in north and central Darfur.[77] While it is true that his three birds were all molting, and therefore in poor condition for study, yet it must be admitted that the identification is doubtless correct. However, Lynes writes that in Darfur it is a "* * * fairly common migrant through the West Basin in early summer to moult and spend the off season; breeding somewhere in the south." The bird is not known to breed anywhere north of the Zambesi, and according to several writers, is not migratory in South Africa, although in Damaraland Andersson found it to be partially migratory, being commoner in the rainy season. In all the vast territory between the Zambesi and the Sudan the species is unknown, so two possibilities suggest themselves: (1) That the South African birds do migrate to Darfur but have hitherto escaped notice, or, (2) that the Darfur birds may turn out to be a new form whose characters can not be appreciated except in full nuptial plumage. In either case, the fact that Lynes's birds, "* * * do not at all agree with the original description of *C. r. ugandae* von Madarász * * * " indicates that the latter (and *fraenatus* and probably *guttifer* as well) are races of *pectoralis* and not of *rufigena*.

Zedlitz[78] has suggested that *fraenatus* may be divisible into two forms—a northern Ethiopian and Eritrean one, and a southern form in the Shoan lakes district and Kenya Colony. He cautions against this idea almost in the same lines by hinting that in Eritrea and the Tigre district the typical birds appear to be somewhat migratory and that therefore they may occur farther south during their nonbreeding season and that the southern birds may be all in off season plumage. I have examined a series of 17 specimens from Ethiopia and Kenya Colony and can find no constant differences between them. On the whole the northern birds tend to average slightly larger and darker, especially with reference to the dark abdominal bars, but the difference is not great even as an average one, and the extremes do not conform with geography. The size variations may be judged from the following table in which

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[77] Ibis, 1925, p. 369.

[78] Journ. f. Ornith., 1910, p. 780; 1915, p. 37.

Locality	Sex	Wing	Tail
Ethiopia, Turturo	♂	166. 0	121. 0
Kenya Colony:			
Embu	♂	164. 5	120. 0
Northern Guaso Nyiro	♂	161. 0	116. 0
Athi River	♂	156. 5	119. 0
Do	♂	155. 0	104. 0
Southern Guaso Nyiro River	♂	159. 0	113. 0
Do	♂	159. 0	110. 0
Thika	♂	159. 0	113. 5
Kamiti	♂	151. 0	112. 5
Ethiopia, Bodessa	♀	161. 0	115. 0
Kenya Colony:			
Fort Hall	♀	166. 0	113. 0
50 miles southwest Lake Naivasha	♀	165. 0	115. 0
Athi River	♀	163. 0	114. 5
Do	♀	159. 5	116. 0
Kapiti Plains	♀	164. 5	112. 0

The range of *fraenatus* as given by Sclater[79] is incomplete. He gives it as "Southern Abyssinia to Kenya Colony," but it is known from extreme northern Ethiopia (Tigre district), Eritrea, and Somaliland south through Kenya Colony to Kilimanjaro, and practically to the Tanganyikan boundary in the Ukamba and Kikuyu districts, and probably extends into Uganda as well.

According to Erlanger[80] this nightjar is an inhabitant of the lowlands where it lives in the steppe country and the Acacia wilderness, and also in the deeper valleys in the mountainous parts of the country.

According to Mearns, the female was making high flights in the air at daybreak when shot.

CAPRIMULGUS FOSSEI APATELIUS Neumann

Caprimulgus apatelius NEUMANN, Orn. Monatsb., vol. 12, p. 143, 1904; Galena River at Abaya Lake, Southern Ethiopia.

Specimens collected:

Female, Ourso, Ethiopia, September 30, 1911.
Male, Bilan, Ethiopia, December 18, 1911.
Female, northwest Abaya Lake, Ethiopia, March 17, 1912.
Female, Black Lake Abaya, Ethiopia, March 24, 1912.
Male and female, Anole village, Ethiopia, May 18, 1912.
Male and female, Turturo, Ethiopia, June 15–16, 1912.
Male, 18 miles south of Malele, Kenya Colony, July 28, 1912.
Male, Tana River at mouth of Thika River, Kenya Colony, August 25, 1912.

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[79] Syst. Avium Ethiop., 1924, p. 249.

[80] Journ. f. Ornith., 1905, p. 497.

In studying the systematics of this species I have examined a series of 32 specimens representing all three races. The literature of this bird is unfortunately rather confusing, the chief bone of contention being the variability in the amount of gradation in the tail feathers. Van Someren[81] has gone to the extreme view of considering *clarus* and *apatelius* conspecific with each other but not with *fossei*, which he divides into two forms, the typical one, and a smaller, eastern race, *mosambiquus*. Before critcizing his action it is only fair to present his case in his own words.

> First of all, throughout a large part of the range of *C. fossei fossei* the form *clarus* occurs as a breeding species, though elsewhere *C. clarus* is found where *C. fossei fossei* is unknown. Now, as regards the supposed character of elongation of central tail feathers and graduation of the others in *C. fossei*, I find that this is not a marked feature and *not any more emphasized than in C. europaeus. But* in *C. clarus* and *C. apatelius* the graduation *is marked*, the average length of the central rectrices over the outermost being 30 and in some as much as 50 millimeters.
>
> I am therefore compelled to treat *C. fossei* as a species with a small race in Mozambique ranging into Tanganyika Territory, and also to treat *C. clarus* as a species or parent race with one subspecies, *C. c. apatelius* * * *. I have compared a large series in coming to these conclusions. Lord Rothschild concurs in my opinion.

Hartert[82] writes that in his opinion *apatelius* must be considered a subspecies of *C. fossei* but is not unmindful of Van Someren's stand.

After examining the specimens and perusing the literature, I can not help but feel that what Van Someren has done was to arbitrarily pick out all the specimens with graduated tails and call them *C. clarus* (or *C. clarus apatelius*) and label those with no graduation *C. fossei* (or *C. f. mosambiquus*). This may be one way of eliminating the rather puzzling rectricial variations of these birds, but it certainly is a high-handed one. It so happens that the series collected by the Childs Frick expedition, in country where *fossei* most certainly does not occur, and which are all definitely what Van Someren would call *C. clarus apatelius*, present the same variations that are found in East Africa where, according to Van Someren, two species, *fossei* and *clarus*, occur together. Only two conclusions, then, are possible—either that there are two species occupying the same country throughout in East Africa or that there is but one species with considerable but not very unusual variation in the differential length of the rectrices. The fact that otherwise the two are identical precludes, I think, the probability of there being two such closely allied specific entities geographically and ecologically coincident over so enormous an area. The fact that the group shows a tendency to produce elongated middle rectrices is of evolutionary interest in showing a possible origin of the highly graduated *Scotornis climacurus*, a point that Van Someren seems to have considered wholly from the wrong angle—that of arranging the variations in an artificial linear series to reduce the gap between *C. fossei* and *Scotornis.* Linear series are often intellectual figments when applied to birds, and to go out of one's way to provide steps where only an original variational tendency is needed seems wholly unnecessary.

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[81] Nov. Zool., vol. 29, 1922, pp. 85–86.

[82] Idem, vol. 29, 1922, p. 402.

The races of *Caprimulgus fossei* are as follows:

1. *C. f. fossei.*—South Africa north to the Katanga, Ruwenzori, Gaboon, and through Nysaland and Mozambique to the coastal portions of southern Tanganyika Territory; rarely as far north as Zanzibar.

2. *C. f. clarus.*—Similar to the typical race but smaller (wings 135 to 150 millimeters as against 153 to 165 millimeters in *fossei*), also paler, more grayish above with sandy or buffy markings: Eastern Unyoro and Ankole districts of Uganda east throughout Kenya Colony to the east coast; also throughout the inland portions of the northern half of Tanganyika Territory.

Sclater[83] has given only a very incomplete statement of range; in fact his western limits (eastern shores of Victoria Nyanza) are over 100 miles east of the type locality. Birds from Mount Kilimanjaro and vicinity which have been referred to typical *fossei* by Oberholser[84] and to *apatelius* by Neumann[85] and Sjöstedt[86] are really *clarus.*

Ogilvie-Grant[87] writes that *clarus* is founded on young specimens of *fossei*, which are paler and of smaller dimensions than the adults. In this he is mistaken, but the reason for his confusion lies in the fact that probably both *fossei* and *clarus* meet in the general vicinity of Ruwenzori.

3. *C. f. apatelius.*—Similar to *clarus* but averaging slightly larger (wings 147 to 162 millimeters). I find that Van Someren is entirely correct in his observation that the character on which Neumann distinguished this bird from the other two races; that is, the white wing mark extending over both webs of the outermost primary, does not hold good in all Ethiopian specimens, and is found in some individuals of *fossei* and *clarus.* Neumann's statement that the range of *apatelius* extends south to Kilimanjaro was undoubtedly based on an aberrant individual of *clarus* in which the white mark was

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[83] Syst. Avium Ethiop., 1924, p. 253.

[84] Proc. U. S. Nat. Mus., vol. 28, 1905, p. 857.

[85] Orn. Monatsb., vol. 12, 1904, p. 143.

[86] Kilimanjaro-Meru Exp., 1910, p. 102.

[87] Ruwenzori Exp., Aves, Trans. Zool. Soc. Lond., vol. 19, 1910, pp. 428–429.

present on the outer as well as the inner webs of the outermost remex. In general, this character does hold within limits. It is wholly a male character, however, the females of *apatelius* usually having no white on the outer web.

The size variations of *apatelius* are indicated in the following table:

Locality	Sex	Wing	Tail	Culmen
Ethiopia:				
Bilan	♂	147.0	121.0	11.0
Anole village	♂	151.0	137.0	11.5
Turturo	♂	153.0	148.0	11.0
Kenya Colony:				
Malele	♂	155.0	133.5	11.0
Tana River	♂	143.0	120.0	-------
Ethiopia:				
Ourso	♀	147.5	110.5	10.5
Northwest Abaya Lake	♀	153.0	117.0	9.5
Black Lake Abaya	♀	149.0	124.5	11.5
Anole village	♀	150.0	122.0	11.5
Turturo	♀	146.0	120.0	10.5

In color the variations are not as marked as in some goatsuckers, but there is a suggestion of dichromatism, slight but real, in the present series. Some adults are grayer, others browner, the difference being most noticeable on the crown and upper wing coverts and scapulars. Zedlitz[88] writes that in Erlanger's collection are two typical *fossei* from the Sagon Valley, and from Woreda, southern Somaliland. These are probably merely aberrant, dark individuals of *apatelius;* at least the locality would suggest the improbability of their being *fossei fossei.*

C. f. apatelius occurs from central Ethiopia (Hawash region) and the southern Shoan lake region east to the Danakil coast and Somaliland (south to Jubaland) and northern Kenya Colony south to the Tana River. It is said to be a bird of the low country, but Mearns collected two at Anole Village at the lower border of the juniper zone.

The Malele and Tana River specimens are the first recorded from Kenya Colony, and extend the range of this race southward for about 200 miles.

According to Erlanger[89] the breeding season in southern Somaliland is in April and May. On April 26 he found two eggs in the Ganale area. They were dirty grayish white flecked with violet ashy gray so extensively that but little of the ground color remained visible. They had a decided gloss and measured 24.5 by 19 millimeters and 23.5 by 19 millimeters respectively.

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[88] Journ. f. Ornith., 1915, p. 38.

[89] Idem, 1905, p. 499.

Order MICROPODIIFORMES

Family MICROPODIDAE

MICROPUS APUS SHELLEYI (Salvadori)

Cypselus shelleyi SALVADORI, Ann. Mus. Civ. Genova, vol. 26, p. 227, 1888: Dembi, Shoa.

Specimens collected:

Male and female, Hawash River, Ethiopia, February 12, 1912.

Both specimens are in dark, fresh plumage.

The material available for study is not sufficient to warrant a revision of the races of this swift. Consequently I follow Meinertzhagen[90] and Sclater.[91] The so-called forms *roehli* Reichenow[92] and *nakuruensis* Van Someren[93] are based on seasonal and individual variations, and are to be considered as synonyms of *shelleyi*. There is a great difference in color between fresh and worn plumages of this bird, the latter being much lighter, more brownish, less blackish than the former, the difference being of the same magnitude as that found between races and even species of swifts. Consequently it is clear that caution must be used in describing new forms in this group.

Furthermore, the fact that birds similar in every way, except in intensity of pigmentation, are found together does not necessarily imply two specific entities. Thus, Lynes[94] writes of swifts in general in Darfur that, "* * * on present evidence, positive and negative, it is reasonable to suppose that a number of individuals of all three Palearctic species do not breed, but remain in Africa every year. Their numbers are too great for these birds to be regarded as merely nonbreeding derelicts; that is, as exceptional, injured or sterile birds, hanging about in odd places while normal birds of their species are breeding elsewhere. They may, like enough prove to be yearling birds (9 to 12 months old), some or all of which are not sexually vigorous enough to breed, as we have recorded to be evidently the rule with yearling birds of some of the Weaver-Finches * * *" It follows, therefore, that young of *Micropus apus apus* or of *Micropus apus pekinensis* may occur in breeding colonies of *Micropus apus shelleyi*. Some such state of affairs is probably the solution of the rather astonishing statement of Van Someren's[95] that *M. shelleyi*, *M. roehli*, and *M. nakuruensis* (as well as *M. horus* and *M. streubeli*) nest together or in close proximity.

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[90] Ibis, 1922, p. 36–42.

[91] Syst. Avium Ethiop., 1924, pp. 256–257.

[92] Orn. Monatsb., vol. 14, p. 172, 1906: Usambara Mts.

[93] Bull. Brit. Orn. Cl., vol. 40, p. 58, 1919: Nakuru.

[94] Ibis, 1925, pp. 360–361.

[95] Nov. Zool., vol. 29, 1922, p. 88.

Meinertzhagen writes that *shelleyi* is a small edition of *pekinensis* "In fresh plumage the head and upper parts are as in *pekinensis*, but with slightly less sheen on the mantle. The center of the back is more or less suffused with dark blackish blue, which almost entirely wears off as the season advances * * *." I have compared a series of both and can find no difference in the dorsal sheen, and Baker [96] makes no mention of any gloss in his description of *pekinensis*. In fact, from the limited material examined (four *shelleyi* and eight *pekinensis*), I should say that, if the very slight difference in the amount of sheen on the mantle were to be considered significant, it would be the reverse of Meinertzhagen's observations.

Males have, on the average, heavier shaft stripes on the throat feathers than females.

Meinertzhagen writes that the Usambara Mountains, Tanganyika Territory, are the southern limit of the range of *shelleyi* and that a swift in the British Museum from Zomba, Nyasaland, probably constitutes another race, having a wing measurement of but 141 millimeters (as against 148–165 millimeters in *shelleyi.*) However, Grant [97] writes that this bird from Zomba is a young individual, and includes the region south to Nyasaland in the range of this subspecies. *Micropus apus shelleyi* occurs, then, from northern Ethiopia, through the interior of Kenya Colony (chiefly to the west of the Rift Valley but also east to Kilimanjaro and the Usambara Mountains in northern Tanganyika Territory), south to Nyasaland.

Its status in the Sudan is doubtful, according to Sclater and Mackworth-Praed [98] who write that, although Antinori is said to have obtained specimens at Berber, which he called *Cypselus dubius*, he wrote [99] that they were, "* * * equal in size to *C. murarius*" (=*M. a. apus*), and that, therefore, the synonymic disposition of *dubius* is rather uncertain, and hence the hesitancy of crediting *shelleyi* to the Sudanese avifauna.

The measurements of the birds collected are as follows: Wing, 157 (male), 151 (female); tail, 71 (male), 72 (female); culmen, 6 (male), 5.5 millimeters (female).

MICROPUS MELBA AFRICANUS (Temminck)

Cypselus alpinus africanus TEMMINCK, Man. Orn., p. 270, 1815: South Africa.

Specimens collected:

Male, Gato River near Gardula, Ethiopia, April 1, 1912.

In giving the range of this subspecies Sclater [1] records it as "doubtful" from Ethiopia and otherwise limits it to the mountains of eastern and southern Africa from Kilimanjaro southward. Reichenow[2] lists *africanus* from Keren, Anseba, Mahal, Uonz, Ailan, Dembi, and other Ethiopian localities. Even allowing for several errors in identification, and assuming that some of these really refer to migrant typical European *melba*, it is not likely that all of them are wrongly identified. The present specimen is undoubtedly *africanus* as it is very dark (darker than any of a small series of South African birds), and has narrow dark shaft stripes on the white throat feathers, thereby agreeing with *africanus* and differing from *melba*. However, the white gular patch is as extensive as in many individuals of the typical race, more so than in typical *africanus*. Further material may suggest that *africanus* is divisible into a northern and a southern form, but at present this is not feasible.

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[96] Fauna Brit. India, Birds, vol. 4, p. 326, 1927.

[97] Ibis, 1915, p. 315.

[98] Idem, 1919, p. 652.

[99] Cat. coll. Uccelli, 1864, p. 25.

[1] Syst. Avium Ethiop., 1924, p. 259.

Of the locality records mentioned by Reichenow, we may strike out the Anseba Valley, as this is based on Blanford's notes,[3] which read as follows:

> This bird was not noticed on the highlands. In the Anseba Valley many appeared at the end of July, none being seen before the 25th. Some of the specimens shot had pale edgings to the feathers, and were evidently young birds; others were of uniform color.

It will be seen that these birds were found in the lowlands, whereas *africanus* is a highland form, and they were also apparently migrants from the north, and were probably typical *Micropus melba melba*.

The altitude of the Gato River near Gardula is about 4,000 feet (1,200 meters), and as far as the few published notes indicate, this would be about the lower limit of the range of *africanus*. Zedlitz[4] records it as by no means abundant in the mountains of Arussi-Gallaland. On Kilimanjaro Sjöstedt[5] records it at altitudes of from 5,000–10,000 feet (1,500–3,000 meters). On Ruwenzori, it is replaced by a much larger form, *maximus* Grant, which occurs from 10,000–14,000 feet (3,000–4,200 meters). It does not appear to have been recorded from Mount Elgon.

The single specimen collected agrees in size with two from South Africa, having a wing length of 203 millimeters.

Recently Hartert[6] has described a race of this swift from British Somaliland, which he has named *archeri*. It is said to be pale in color (like *tuneti* of Tunis) but small, especially as regards the wing and tail, the former varying in length from 195–207 millimeters. It may be noted that the present specimen comes within the limits of the size variation of *archeri*, but the intense darkness of its coloration clearly shows that it has nothing to do with Hartert's form. Blanford's Anseba birds may possibly have been *archeri*.

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[2] Vög. Afr., vol. 2, p. 377.

[3] Geol. and Zool. Abyss., 1870, p. 335.

[4] Journ. f. Ornith., 1910, p. 782.

[5] Kilimanjaro-Meru Exp., Vög., 1910, p. 102.

[6] Nov. Zool., vol. 34, 1928, p. 363.

MICROPUS AFFINIS ABESSYNICUS (Streubel)

Cypselus abessynicus Streubel, Isis, 1848, col. 354: Ethiopia.

Specimens collected:
Female, Malata, Ethiopia, June 22, 1912.

At first glance this specimen appears to have a very narrow bill, but careful examination shows this to be due to the tight wrapping of the bill when the bird was skinned.

The various revisions of the subspecies of this swift are far from uniform in their conclusions, a lack of harmony which, together with the insufficient material at hand, prevents me from getting very far in my study of this bird. Hartert[7] does not mention *abessynicus* at all but considers all tropical African birds the same as typical Indian *affinis*. He writes that specimens from São Thomé and Ceylon are the darkest. The birds of the latter island have since been separated by Madarász[8] under the name *singalensis*, and are said to differ not only in darker coloration but also in having longer tails than *affinis*. Hartert considers *koenigi* a synonym of *galilejensis* although Kollibay[9] kept the two distinct. More recently Hartert[10] has recorded *galilejensis* from as far south as Asben and Kano, western Sudan, but states that birds from Zaria are not separable from tropical African ones. Still more recently Grote[11] lists *galilejensis* from the Lake Chad region but writes that it is a migrant or winter visitor in that district. Lynes,[12] however, found *abessynicus* to inhabit north and central Darfur, where it is a common resident in the hills and mountains. When we consider that so very many Sudanese birds range almost from the Nile to Senegal without local differentiation, and bear in mind the wide-ranging flying ability of swifts it is somewhat puzzling to find two forms, an eastern and a western one, inhabiting the Sudanese savanna belt. However, it appears that *galilejensis* is only a winter visitor in the western part of that area, and that *abessynicus* is the breeding form right across. It is not known if *abessynicus* is migratory anywhere in its range, but if it is not, the absence of records from Lake Chad is difficult to account for.

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[7] Vog. pal. Fauna, vol. 2, p. 842.
[8] Ann. Mus. Hungar., vol. 9, 1911, p. 420, pl. 16, fig. 4.
[9] Journ. f. Ornith., 1905, p. 303.
[10] Nov. Zool., vol. 28, 1921, p. 111.
[11] Journ. f. Ornith., 1928, p. 762.
[12] Ibis, 1925, p. 365.

Micropus affinis abessynicus ranges from Gambia, Liberia, and Northern Nigeria east to Ethiopia, Eritrea, Somaliland, and southwestern Arabia, south to Angola and the eastern part of the Cape Province, omitting the arid country of the Kalahari region, the Southwest African Protectorate, Namaqualand and Ovampoland. But little has been recorded of its breeding. Loveridge found occupied nests at Kilosa, Tanganyika Territory on May 5, 1922, and the Harvard Medical School's African expedition obtained two nestlings at Monrovia, Liberia, on November 19. These two specimens show that the juvenal plumage is similar to the adult type. The natal down is dark mouse gray.

MICROPUS HORUS (Heuglin)

Cypselus affinis var. *horus* HEUGLIN, Orn. N. O.-Afr., vol. 1, p. 147, 1869: Northeast Africa.

Specimens collected:

One male and one unsexed, Gato River near Gardula, Ethiopia, May 13, 1912.

One male, Mar Mora, Ethiopia, June 14, 1912.

One male, Escarpment, 7,390 feet (2,200 meters), Kenya Colony, September 10, 1912.

This swift occurs from central Ethiopia and the Sudan (west to Darfur) south through Kenya Colony to Kilimanjaro, and, according to Roberts, to the Zambesi Valley in the east, while in the west it has been taken in northern Angola and at the mouth of the Congo. As far as I know, it is unrecorded from between the latter region and the eastern part of Darfur or western Kenya Colony.

The birds from Gato River were in breeding condition. In his field book, Mearns wrote as follows: "* * * A colony of about a dozen pairs are nesting in a high bluff. I saw several emerge from holes." The two from Mar Mora and Escarpment are in more abraded plumage than the Gato River birds. Van Someren[13] suggests (without actually saying so) that this bird breeds at Lakes Naivasha and Nakuru, Kenya Colony, but does not give any dates. Erlanger[14] obtained a nestling at Hakaki, near Adis Abeba, July 7, from an old nest of *Hirundo emini.*

Inasmuch as this species is far from common in collections I append the measurements of the four specimens listed above.

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[13] Nov. Zool., vol. 29, 1922, p. 88.

[14] Journ. f. Ornith., 1905, p. 672.

Locality	Sex	Wing	Tail
Ethiopia:			
Gato River	------	152	62
Do	♂	152	55
Mar Mora	♂	149	59
Kenya Colony, Escarpment	♂	154	58

CYPSIURUS PARVUS MYOCHROUS (Reichenow)

Cypselus myochrous Reichenow, Journ. f. Ornith., 1886, p. 116: Karema, Tanganyika Territory.

Specimens collected:

One female, Konso, Sagon River, Ethiopia, April 7, 1912.

One female, Guaso Nyiro River, Kenya Colony, August 2, 1912.

Two female adults and one female young, Tharaka District, Kenya Colony, August 13, 1912.

As was pointed out by Grote [15] the generic name *Cypsiurus* Lesson 1843 is not preoccupied by *Cypsilurus* Swainson 1839 (Pisces), so Oberholser's name *Tachynautes* [16] must be relegated to synonymy.

The palm swift occurs throughout most of Africa and Madagascar and breaks up into at least four races, as outlined by Sclater [17] and others. The range of *myochrous* as given in Sclater's list needs emendation. He gives it as "southern Uganda, Kenya Colony, and Tanganyika Territory to the Zambesi and perhaps northern Damaraland." However, as the present specimens show, *myochrous* occurs north to southern Ethiopia (Sagon River).

Tachornis parvus griseus Zedlitz [18] is a synonym of typical *parvus* as was pointed out by Grant [19] but I have some doubt about the proper disposition of *Tachornis parvus laemostigma* Reichenow.[20] Grant, Sclater, and others consider this a synonym of *parvus*. While it is true that the character given by Reichenow (heavier throat streaks) does not hold very well, still all the birds from the northern half of Kenya Colony and the one from southern Ethiopia are intermediate in coloration between typical *parvus* and typical *myochrous*. It may be that an intermediate form could be maintained, in which case the name *laemostigma* would be available. All the present series would belong to this form.

As far as I have been able to determine the typical race does not occur south of Ethiopia and the Sudan. However, Roberts [21] records it from the northwestern coastal area of South Africa and *myochrous* from the northeastern part of that country. Something must be wrong here, but it is obvious that he finds that two forms occur in Africa south of the Zambesi. I can not help feeling that instead of *parvus* Roberts meant to write *brachypterus*, which is known from Angola and may therefore be expected in the adjacent region to the south. Yet Sclater[17] includes northern Damaraland in the range of *myochrous*.

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[15] Journ. f. Ornith., 1928, p. 762.

[16] Proc. U. S. Nat. Mus., vol. 28, 1905, p. 860.

[17] Syst. Avium Ethiop., 1924, p. 261.

[18] Orn. Monatsb., vol. 18, 1910, p. 58: Adiabo-Steppe.

[19] Ibis, 1915, p. 310.

[20] Vög. Afr., vol. 3, 1905, p. 828: South Somaliland.

[21] Ann. Transvaal Mus., vol. 10, pt. 3, 1924, p. 151.

Lönnberg[22] records *myochrous* from Luazomela, Kenya Colony, but writes that he is uncertain as to whether the birds seen in the Guaso Nyiro country belong to this form or to *parvus*. I have seen birds from the latter region and they are *myochrous*. The geographical limits of *parvus* and *myochrous* in Ethiopia are somewhat indefinitely known. Reichenow[23] says that two birds from Filoa, Hawash district, and one from Dolo, Ganale region, are *parvus*, while others from Dolo, from Ganale, and one from Bardera, southern Somaliland, are *laemostigma*. I consider the latter form merely an aggregate of intermediates between *parvus* and *myochrous*, at least until more material becomes available for study. Zedlitz[24] claims that *laemostigma* is smaller than either *parvus* or *myochrous*, and gives the wing length as over 130 millimeters in the last, up to 130 millimeters in the second, and from 120–130 millimeters in the first named. I have measured a series of 11 adults representing all three, and find no constant size difference. Thus, an undoubted example (male) of *parvus* from the Blue Nile has a wing length of 123 millimeters, while Tanganyikan specimens of *myochrous* vary from 118–130 millimeters in this regard. The series collected by the Frick expedition have wing lengths of from 120.5–124 millimeters. Claude Grant[19] likewise found that no reliance could be placed on the wing measurement as a taxonomic character.

The character of the throat patch seems to be one of age. Year-old birds have plain grayish throats, while older individuals have whitish gular feathers with dusky shaft streaks.

The juvenal bird from Tharaka has the rusty edges of the feathers of the upper parts much paler, more sandy buff, less rufous, than another comparable bird from Dar es Salaam.

Throughout its range, this bird is fairly rigidly restricted to the vicinity of palms in which it nests. Heuglin noted that in the upper parts of the Nile Valley the birds built their nests in the axils or glued to the downward drooping leaves of the dom palms (*Hyphene*

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[17] Syst. Avium Ethiop., 1924, p. 261.

[19] Ibis, 1915, p. 310.

[22] Kungl. Sv. Vet. Akad. Handlgr., vol. 47, 1911, p. 78.

[23] In the last part of Erlanger's "Beiträge zur Vogelfauna Nordostafrikas," Journ. f. Ornith., 1905, pp. 672–673.

[24] Journ. f. Ornith., 1910, pp. 782–784.

thebaica). Lynes made similar observations in the Darfur province of the Sudan, where the species is a rather uncommon resident in the southern and western parts of the plains, "* * * but only where doleib or dom palm trees are present; probably breeding in winter." He found nests containing fresh eggs and nestlings at Khartoum at Christmas time.

Usually the species occurs in fair numbers wherever it is found, as the following observations entered in his diary by Mearns indicate. Malele and region to the south for 45 miles, July 29–30, 40 seen; Northern Guaso Nyiro River, July 31 to August 3, 100; Lekiundu River, August 8, 4 seen; Tharaka district, August 12–13, 130 noted; Tana River, August 14–16, 400 birds seen.

TELACANTHURA USSHERI STICTILAEMA (Reichenow)

Cypselus stictilaemus Reichenow, Orn. Centralbl., 1879, p. 114: Ualimi, Tana River, Kenya Colony.

Specimens collected:

Male, Meru Forest, Kenya Colony, August 9, 1912.
Male, Guaso Mara River, Kenya Colony, August 9, 1912.

These two specimens agree with another (the only other example seen) from Mombasa. With no comparative series available I can do no better than to accept the arrangement given by Sclater [25] with the hope that if there are any mistakes in his conclusions they will be corrected by other investigators. It may be noted, however, that Sclater recognizes *benguellensis* and, with reservations, *marwitzi* as well, while Bannerman [26] considers both these forms identical with *stictilaema*.

In Kenya Colony this swift appears to be rather scarce. Van Someren [27] did not have any examples in his extensive collection, and, as far as I have been able to ascertain, the bird was known only from two localities in that country—Ualimi and Mombasa, before the present specimens were procured. These two birds are therefore the northwesternmost captures of the race and extend the known range of *stictilaema* northwestward from Ualimi on the lower Tana River by approximately 350 miles.

The two birds collected are in fresh plumage, while another from Mombasa, June 14, is in very worn feathering—so abraded that the spiny projecting rectricial shafts are completely worn away. This indicates that in Kenya Colony the birds molt between the middle of June and the first half of August, and inasmuch as swifts generally have but one complete molt a year, the postnuptial one, it would appear that the breeding season is probably in April and May.

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[25] Syst. Avium Ethiop., 1924, p. 262.

[26] Ibis, 1923, pp. 730–731.

[27] Nov. Zool., vol. 29, 1922.

Order COLIIFORMES

Family COLIIDAE

COLIUS STRIATUS Gmelin

While studying the 46 specimens of this mouse bird collected by the Frick expedition I have taken the opportunity of investigating the systematics of this species. All in all, over 200 specimens have been examined representing all the races recognized below except *leucotis.* To simplify matters, I may briefly compare the arrangement arrived at here with that followed by Sclater[28] as the main points of interest to students of African birds are the points of difference between the two systems.

1. The following races are recognized here, but not by Sclater—*mombassicus*, *kikuyuensis*, and *jebelensis.*

2. The form *ugandae* is recognized by Sclater, but as I shall show a little further on, it is the same as *jebelensis*, and the former name is a synonym of the latter.

3. The following names, which Sclater does not dispose of, are considered as follows:

C. s. cinerascens is a synonym of *C. s. affinis.*
C. s. marsabit is a synonym of *C. s. kikuyuensis.*
C. s. congicus is a synonym of *C. s. berlepschi.*
C. s. kirbyi is a synonym of *C. s. minor.*
C. s. nigriscapalis is a synonym of *C. s. nigricollis.*

The races of the speckled coly recognized by me are as follows:

(*a*) *C. s. striatus.*—Southern Cape Province, from Cape Town east to King William's Town; wing length 86–97 millimeters in the male, 92–97 millimeters in females.

(*b*) *C. s. minor.*—Southeastern Africa from the eastern Cape Province (East London district) Pondoland, Natal, the Transvaal, Basutoland, Zululand, Swaziland, and Mozambique to eastern Mashonaland, Nyasaland, and the Rovuma River (southern boundary of Tanganyika Territory). This form is similar to *striatus*, but has the throat more blackish. The name *minor* is a poor one, as this form is not smaller than the typical race; wing length 83–96 millimeters in the male, 83–93 millimeters in the female.

(*c*) *C. s. berlepschi.*—Northwestern Nyasaland, northeastern Northern Rhodesia, and southwestern Tanganyika Territory (northeast to the Uhehe highlands and Ujiji) and the Katanga north to the southern limit of the Congo rain forest, west as far as the

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[28] Syst. Avium Ethiop., 1924, pp. 265–266.

Kasai. This race has the cheeks smoky grayish white (in *striatus* and *minor* the cheeks are pale grayish brown like the crown), the barring of the nape and interscapulars indistinct or absent (as in *minor*); the throat dark, without light tips (thereby agreeing again with *minor*); wings, 94–101 millimeters in the males, 93–97 millimeters in the females.

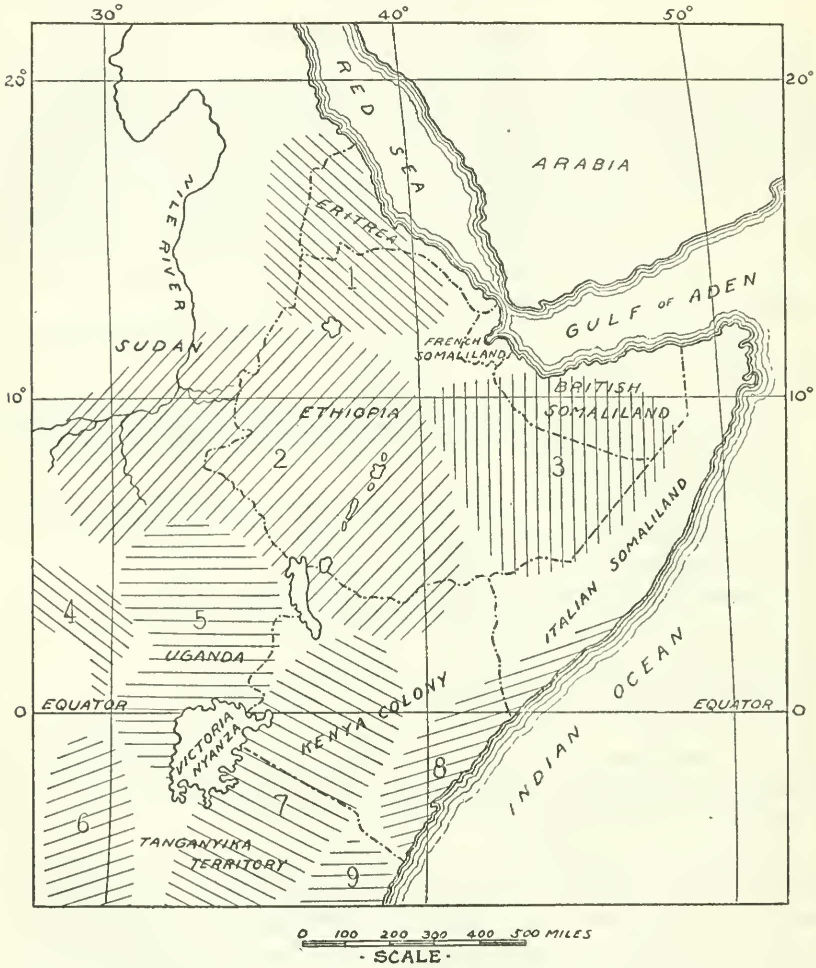

FIGURE 9.—Distribution of Colius striatus in northeastern Africa: 1, Colius striatus leucotis; 2, Colius striatus erlangeri; 3, Colius striatus hilgerti; 4, Colius striatus leucophthalmus; 5, Colius striatus jebelensis; 6, Colius striatus kiwuensis; 7, Colius stiatus kikuyuensis; 8, Colius striatus mombassicus; 9, Colius striatus affinis

(*d*) *C. s. affinis*.—Eastern Tanganyika Territory, inland as far as Dodoma and the Kilimanjaro district. Generally lighter in color than *berlepschi*, the auriculars whiter, the black throat feathers tipped with whitish giving that region a clouded appearance, breast lightly, but distinctly barred, wings, 93–96 millimeters in the males, 86–93 millimeters in the females.

(*e*) *C. s. mombassicus.*—The coastal districts of Kenya Colony from Mombasa (inland to Voi), north to southern Italian Somaliland. Nearest to *C. s. affinis* but more grayish on the head, neck, and interscapulars; the nape and mantle more widely barred (that is the dark bars more widely spaced); the cheeks whiter; the breast and abdomen slightly darker; wings, 91–93 millimeters in males, 86–97 millimeters in females.

(*f*) *C. s. kikuyuensis.*—The Uhehe, Tabora, Mwanza, and Ikoma districts of Tanganyika Territory north to Kavirondo, Loita Plains, and Ukamba districts of Kenya Colony east to Mount Kenia, north to Marsabit and the country south of Lake Rudolf. Differs from *mombassicus* in having darker cheeks and throat blackish with gray tips to the feathers, auriculars silver gray, mantle darker, faintly barred, and larger, wing, 100–107 millimeters in the males, 95–105 millimeters in the females.

(*g*) *C. s. jebelensis.*—Uganda (north to Gondokoro) and northeastern Ruanda. Similar to *kikuyuensis* but slightly lighter, size smaller, wings, 96–104 millimeters in the male, 93–100 millimeters in the female. This race is only an average one in its characters, although Hartert[29] writes that the series in Tring, "* * * shows that *kikuyuensis* is a much darker form * * *." This is the race that is currently known as *ugandensis* Van Someren,[30] but it is indistinguishable from the type and paratypes of *jebelensis*. The reason for the general confusion about *jebelensis* (which is usually considered a synonym of *erlangeri*) is that the type came from an intermediate locality (Gondokoro) where *erlangeri* occurs more frequently, if anything, than *jebelensis* itself. Consequently, if a person to whom the type were not available were to examine a small series from Gondokoro he would quite naturally conclude that the birds were probably *erlangeri* and sink *jebelensis* into synonymy. However, in the original description of the latter, Mearns[31] wrote that the throat is black, each feather with a whitish terminal spot, while in *erlangeri* the throat is certainly not black but merely clouded and narrowly transversely barred with blackish. Another thing that has caused confusion with regard to this form is that Mearns compared it with *berlepschi*, but his series of the latter are not *berlepschi* at all, but *kikuyuensis*.

(*h*) *C. s. kiwuensis.*—The Kivu district of the Belgian Congo, south along the west shore of Lake Tanganyika to about Albertville, north through western Urundi and Ruanda to the southern end of the Ruwenzori range. Similar to *jebelensis* but slightly darker, size as in *jebelensis.*

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[29] Nov. Zool., vol. 31, 1924, p. 128.

[30] Bull. Brit. Orn. Cl., vol. 40, 1919, p. 26: Chagwe, Uganda.

[31] Proc. U. S. Nat. Mus., vol. 48, 1915, p. 394.

(*i*) *C. s. hilgerti.*—Southern British Somaliland, western Italian Somaliland, and the eastern portion of Ethiopia (west to Dire Daoua, Sadi Malka, the Hawash River, and the Arussi Plateau) south to the Kenya Colony boundary. This is a dark race with deep buffy, not grayish or whitish auriculars; wing, 103 millimeters in male (1 specimen), 93–101.5 millimeters in females.

(*j*) *C. s. erlangeri.*—Western and southwestern Ethiopia and northern Kenya Colony to the Upper White Nile district of the Sudan where it meets and merges with *jebelensis.* Much lighter than *hilgerti*, the throat not black, but clouded and narrowly barred with black, the ear coverts grayish white; wing length 90–103 millimeters in the males, 80–100 in the females.

(*k*) *C. s. leucotis.*—Eritrea, Bogosland, and northern Ethiopia (Tigre district), and adjacent parts of the Sudan. Lightest of all the races, throat light gray faintly barred with blackish, cheeks and auriculars white, wings 99–103 millimeters.[32]

(*l*) *C. s. leucophthalmus.*—Savanna region of the northeastern Congo basin, from the Nepoko River northward to the southern border of the Anglo-Egyptian Sudan, and probably extending westward along the northern edge of the Congo forest. This bird and the next, *nigricollis*, differ from all the other races of *Colius striatus* in that they have black foreheads. In the present subspecies the iris is white, the hind neck and upper back are barred with dark brown; wings, 87–96 millimeters in the males, 86–97 millimeters in the females.[33]

(*m*) *C. s. nigricollis.*—Cameroon to the lower Congo, east to Shari and lower Ubangi Rivers. Similar to *leucophthalmus* but with brown iris, no bars on hind neck and interscapulars; wings, 92–99 millimeters (both sexes, as sexes are alike in size).

In the character of the black forehead the last two races suggest an affinity with *castanotus*, but the latter is so very distinct (lower back and rump bright reddish brown) that I follow Sclater and keep it specifically distinct.

COLIUS STRIATUS KIKUYUENSIS Van Someren

Colius striatus kikuyuensis Van Someren, Bull. Brit. Orn. Club, vol. 40, 1919, p. 27: Nairobi.

Specimens collected:

One male and two females, Lekiundu River, Kenya Colony, August 4, 1912.

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[32] According to Zedlitz, Journ. f. Ornith., 1910, p. 755.

[33] Most of this taken direct from Chapin, Amer. Mus. Nov., no. 7, 1921, pp. 2–5.

One male, near Juja Farm, Athi River, Kenya Colony, August 20, 1912.

Seven males and one female, Escarpment, 7,390 feet (2,200 meters), Kenya Colony, September 4–9, 1912.

Granvik[34] writes that he can not distinguish between this race and *jebelensis* (*ugandensis* of his paper) but Hartert[35] says that the series at Tring shows that *kikuyuensis* is a much darker form. My observations agree with those of Hartert except that I doubt that the two forms are quite as well marked as Hartert's statement implies. Long series show the differences in size and color to overlap considerably.

The total series of this race examined illustrates all the plumages of this coly.

Three nestlings are of interest because of the peculiar pterylosis of mouse birds. The adults are commonly said to have no apteria except one on the occiput, and anyone who has ever skinned a coly has observed that there is no large bare area on the ventral surface of the body as in almost all other birds. A very young nestling, taken April 4 on the Tana River (F. R. Wulsin collection) shows not only the occipital apterium, but also a pair of bare tracts, one on each side of the throat, beginning ventral and caudal to the auriculars and extending diagonally dorsally and posteriorly and meeting on the lower hind neck, separating the neck pteryla from the spinal one, and then extending caudally for a short distance on either side of the spinal pteryla, diverging laterally to their respective terminations just posterior to the wings. In his great work on pterylosis Nitzsch[36] indicates these two apteria but does not bring them together on the nape. His drawing shows the neck and spinal pterylae to be continuous, which they are not. He also states that colies have a simple (that is, not paired) ventral bare space entirely confined to the hindmost part of the body, and surrounding the anal opening. In his drawing, however, it is far too large, as it is shown extending forward to the posterior end of the sternum. In the three nestlings examined, this apterium is very small and narrow.

The order of development of the first pennaceous feathering is as follows. Apparently the remiges and rectrices sprout from their sheaths about the same time as the dorsal body feathering and the feathers of the crown. The flanks and thighs come in next, then the ventral body plumage, then the forehead, cheeks, and nape, and finally the feathers of the lores, chin, and throat. The entire body and head plumage is well grown before the remiges and rectrices have attained their full size.

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[34] Journ. f. Ornith., 1923, Sonderheft, pp. 95–96.

[35] Nov. Zool., vol. 31, 1924, p. 128.

[36] Edition by P. L. Sclater, Ray Soc., 1867, p. 107, pl. 6, figs. 10 and 11.

The juvenal plumage is fairly similar to that of the adult except in the color of the back and the upper wing coverts. The latter, which are plain in the adult, are terminally edged with buffy brown in the young, giving the overlapping rows of coverts a barred appearance. The back is bicolored—a ground color of buffy with two broad, lengthwise bands of darker brown feathers, each of which is barred with blackish, and tipped with yellowish buff. These two bands are separated by a narrow light buffy mid-dorsal stripe. The ground color (which is merely the mid-dorsal stripe, and the areas lateral to the dark bands) varies greatly in color. In one specimen it is tawny, in another very light buff, almost buffy white. As the bird grows, the feathers comprising the two dorsal bands grow faster and larger than the lighter feathers and gradually dominate the color scheme, producing a contrastingly barred effect on the back.

One of the males collected by Mearns at Escarpment is in an advanced stage of the postjuvenal molt. The head, cheeks, chin, throat, nape, and mantle are newly feathered; the juvenal plumage still remains on the back, rump, and upper tail coverts. A few juvenal greater upper wing coverts remain, but the majority are new (adult). The belly plumage is molting and the rectrices and remiges are partly juvenal, partly adult. The wing molt begins at the carpus and extends in both directions from it; the tail molt is centripetal.

It is difficult to say how long the juvenal plumage is worn. The three nestlings already referred to were taken on the following dates: April 4, and July 2. The full-grown bird in postjuvenal molt was collected on September 9 (all taken within a distance of about 500 miles). But these dates do not necessarily mean anything, as Van Someren[37] writes that these birds—

> * * * apparently nest during every month of the year. Their nests are constructed of twigs and rootlets and fibre, and lined with fine fibre and leaves of the wild asparagus * * *. The eggs are white, with a matt surface * * *. Young nestlings are curious-looking creatures, flesh pink in color, with greenish bills, bluish skin over the eyes, reddish feet, and orange-colored mouths.

The adults in the present series are mostly in molt, but some are in full fresh plumage, others in worn plumage, indicating that birds in all plumage conditions are to be found at all times.

The measurements of the birds collected by Mearns are as follows:

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[37] Ibis, 1916, p. 241.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Kenya Colony:					
Lekiundu River	♂	98. 0	230	13. 0	22. 0
Do	♀	94. 0	227	13. 0	23. 0
Do	♀	101. 0	260	13. 0	22. 0
Near Juja Farm	♂	94. 0	251	13. 5	21. 5
Escarpment	♂	102. 5	--------	14. 0	24. 0
Do	♂	97. 0	231	14. 0	22. 0
Do	♂	95. 0	197	14. 0	22. 5
Do	♂	95. 5	227	14. 5	23. 0
Do	♂	93. 0	219	14. 0	23. 0
Do	♂	94. 0	183	14. 0	23. 5
Do	♂	98. 0	234	13. 0	22. 0
Do	♀	96. 0	233	13. 0	22. 0

Two specimens from Marsabit (topotypes of *C. s. marsabit* Jackson) are intermediate between *erlangeri* and *kikuyuensis*, but slightly nearer the latter, with which race I synonymize *marsabit.*

Mearns recorded this race of the speckled mouse bird as follows: Plains at base and south of Endoto Mountains, July 19–24, 110 birds seen; Lekiundu River, August 4–8, 90 seen; Kilindini and Meru, August 10, 50; Theraka district, August 11–12, 12 birds; Athi River, August 30, 1 noted; Escarpment, September 4–12, 300 birds.

COLIUS STRIATUS ERLANGERI Zedlitz

Colius striatus erlangeri Zedlitz, Orn. Monatsb., 1910, p. 191: Djam Djam, southwestern Ethiopia.

Specimens collected:

One male, Adis Abeba, Ethiopia, January 8, 1912.

One (tail only) near Ankober, Ethiopia, January 24, 1912.

One male, Kofali, Arussi Plateau, Ethiopia, March 1, 1912.

One male, Loco, Sidamo, Ethiopia, March 13, 1912.

One female, Gidabo River, Ethiopia, March 16, 1912.

One female, Gardula, Ethiopia, March 27, 1912.

Eight male adults, three male young, and seven female adults, Gato River near Gardula, Ethiopia, March 31 to May 11, 1912.

One male, Sagon River, Ethiopia, June 5, 1912.

Soft parts (male): Iris, bluish black; bill with maxilla black with a large gray spot at base above and small white spots near base on sides, mandible white, black at base; feet, red; claws, black.

The juvenal plumage of this race differs from that of *kikuyuensis* in the following particulars: The cheeks and auriculars are grayer than in *kikuyuensis* and the feathers are narrowly barred with black, while in the latter they are not. The mantle is more conspicuously barred in the present subspecies, and the general tone of the entire plumage lighter than in the central Kenian race, and, of course, the throat is not black, but only dark grayish.

Two of the birds from Gato River (a male collected April 9, and a female May 11) are in postjuvenal molt. The order of feather renewal (as far as it may be told from two dead specimens) is like that described for *kikuyuensis*. As in the latter form, the tail molt is centripetal, the wing molt progressively divergent from the carpus.

On May 11, Mearns shot a mated pair at Gato River near Gardula. Although the juvenal birds collected there April 9 to May 1 indicate by their stages of growth that the nesting season must begin not later than January (if there is a definite breeding season), the finding of a mated pair on May 11 is not unusual, as Erlanger[38] obtained two nestlings on May 17 at Abu-el-Kater. He also found nests with eggs (three to a nest) at Harrar on April 7 and 11.

According to Erlanger this bird lives chiefly in the highlands, and is replaced in the lowlands by *Colius macrourus*. Zedlitz[39] corroborates this observation.

The size measurements of the adults of the present series are tabulated below:

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Kofali, Arussi Plateau	♂	99. 0	230	13. 0	24. 0
Adis Abeba	♂	99. 0	243	12. 5	23. 0
Loco, Sidamo	♂	100. 0	-------	14. 0	23. 0
Sagon River	♂	90. 0	240	13. 5	22. 0
Gato River near Gardula	♂	97. 0	201	13. 0	22. 0
Do	♂	96. 0	238	13. 0	23. 0
Do	♂	94. 0	238	13. 0	24. 0
Do	♂	97. 0	252	14. 0	23. 0
Do	♂	93. 0	234	14. 0	24. 0
Do	♂	99. 0	-------	14. 0	22. 0
Do	♂	93. 0	241	13. 0	23. 0
Do	♂	97. 0	238	13. 0	22. 5
Do	♀	96. 0	228	13. 5	21. 0
Do	♀	97. 0	236	13. 5	21. 5
Do	♀	100. 0	231	13. 0	23. 0
Do	♀	98. 0	230	13. 0	22. 0
Do	♀	95. 5	238	14. 0	21. 0
Do	♀	100. 0	-------	13. 0	22. 0
Do	♀	80. 0	-------	13. 0	20. 5
Gardula	♀	97. 0	-------	13. 0	23. 0
Gidabo River	♀	97. 5	241	13. 5	22. 0

Mearns entered the following observations of this bird in his field notebooks. Aletta, March 7–13, 4 seen; Loco, March 13–15, 4 birds; Gidabo River, March 15–17, 14 birds; Abaya Lakes, March

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[38] Journ. f. Ornith., 1905, p. 488.

[39] Idem, 1910, p. 757.

18–26, 124 noted; near Gardula, March 26–29, 50; Gato River, March 29 to May 17, 1,000 seen; Bodessa and Sagon River, May 18 to June 6, 80; El Ade, June 12–14, 10 seen; Mar Mora, June 15, 10 seen; Turturo, June 15–17, 10 birds; Anole, June 17, 20 noted; Wobok, June 18, 40; near Saru, June 19, 25 seen; Yebo, June 20, 20 birds; Karsa Barecha, June 21, 10 birds noted.

COLIUS STRIATUS HILGERTI Zedlitz

Colius striatus hilgerti Zedlitz, Orn, Monatsb., 1910, p. 58: Harrar.

Specimens collected:

Four females, Dire Daoua, Ethiopia, December 21–22, 1911.

One female, Sadi Malka, Ethiopia, January 28, 1912.

One female, Hawash River, above Sadi Malka, Ethiopia, February 9, 1912.

One female, Serri, Upper Hawash, Ethiopia, February 13, 1912.

One male, one female, Arussi Plateau, Ethiopia, February 17, 1912.

The last two birds listed were collected in a thicket of *Hypericum* sp. at an altitude of 9,000 feet (2,700 meters). The four from Dire Daoua were collected by H. and F. von Zülow. The measurements of this series are as follows:

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Dire Daoua	♀	96. 0	221	12. 5	21. 5
Do	♀	96. 0	-------	12. 5	23. 0
Do	♀	95. 0	214	12. 5	22. 0
Do	♀	97. 0	-------	13. 0	23. 0
Sadi Malka	♀	93. 0	218	13. 5	21. 0
Hawash River	♀	98. 0	232	14. 0	21. 0
Serri	♀	101. 5	249	13. 0	23. 5
Arussi Plateau	♀	98. 0	236	12. 5	23. 0
Do	♂	103. 0	247	13. 0	24. 0

COLIUS LEUCOCEPHALUS TURNERI Van Someren

Colius leucocephalus turneri Van Someren, Bull. Brit. Orn. Cl., vol. 40, p. 27, 1919: Northern Guaso Nyiro.

Specimens collected:

Five adult males, 18 miles south of Malele, Kenya Colony, July 29, 1912.

Two females (= male adult), 24 miles south of Malele, Kenya Colony, July 29, 1912.

The white-headed mouse bird is one of the two most restricted species of its family as far as its geographical distribution is concerned, the other being *castanotus* of Benguella. While the latter is a single taxonomic entity throughout its range, the former divides into two well marked races, as follows:

1. *C. l. leucocephalus.*—Southeastern Kenya Colony (Teita and Taveta districts) south to Kilimanjaro and Aruscha, north along the coast to Witu and the lower reaches of the Tana River.

2. *C. l. turneri.*—Distinguished from the typical form by having the cheeks more grayish, less brownish; and the vinous pink restricted to the upper breast and sides. This form inhabits the country from north of Mount Kenia to Lake Rudolf and east to southern Somaliland. I have not seen any specimens from Witu or Pokomoni, but they are probably not typical *turneri.* Van Someren [40] gives several other characters for *turneri*, namely, the darker gray of the wings, back, and rump, slightly darker throat, and more clearly defined barrings on the hind neck and mantle. However, none of these characters seems to hold, as a bird from Maktau (from which region Van Someren records typical *leucocephalus*) agrees in these respects with the present series. In fact, it is slightly darker (not paler) on the back, wings, and rump than the northern birds.

The measurements of the birds collected by Mearns are as follows:

Locality	Sex	Wing	Tail	Culmen	Tarsus
18 miles south of Malele	♂ adult	93.0	202	11.5	21.0
Do	do	88.5	224	10.0	20.0
Do	do	82.0	207	10.5	20.0
Do	do	92.5	330	11.5	21.0
Do	do	85.0	218	11.0	21.0
24 miles south of Malele	“♀”=♂ adult	85.0	------	11.0	20.5
Do	do	86.0	226	10.5	20.0

Five of these birds were molting when collected. Inasmuch as little has been written on the molts of colies, the following observations may be of interest. The wing molt not only precedes that of the tail but the two do not overlap; that is, the first is completed before the second begins. The remigial ecdysis begins at the carpal joint and proceeds both proximally and distally from that point. One specimen is replacing the next to the outermost primary while the two proximal to it are old, so it may be that a second ecdysial center appears later. The caudal molt is centripetal and rather prolonged as each pair of feathers grows to its full length (or nearly so) before the next pair are shed. The body molt appears to be irregular, but more material is needed for its elucidation.

Sclater [41] correctly states Kinakomba as the type locality of the typical race, but then limits the range of this form to the “country south of Kilimanjaro, Tanganyika Territory," or, in other words leaves the type locality stranded approximately 200 miles outside the stated geographic limits of the subspecies.

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[40] Nov. Zool., vol. 29, 1922, p. 71.

[41] Syst. Avium Ethiop., 1924, p. 266.

The general impression that one gains from going through the literature is that this coly is rather scarce and consequently little is known of its habits. However, this is really due to the fact that few collectors take the time to make worth-while observations. That the bird is not uncommon is indicated by the following records in Mearns' diary. Plains at base and south of Endoto Mountains, July 19–24, 60 birds seen; Er-re-re, July 25, 100; Le-se-dun, July 26, 100; Malele and country to the south to the Northern Guaso Nyiro River, July 27–31, 1,000 birds noted.

COLIUS MACROURUS MACROURUS (Linnaeus)

Lanius macrourus LINNAEUS, Syst. Nat., ed. 12, vol. 1, p. 134, 1766: Senegal.

Specimens collected:

One unsexed, Ourso, Ethiopia, no date. Cepharino collection.

Eight male adults, three female adults, one unsexed, Dire Daoua, Ethiopia, December 2–21, 1911.

Two male adults, one female adult, Sadi Malka, Ethiopia, January 27, 1912.

The blue-naped mouse bird occurs in eastern and northeastern Africa, westward across the Sudan to Senegal. In studying its systematics I have examined a series of nearly a hundred specimens representing all the valid races. I recognize three forms, agreeing in my conclusions with Sclater[42] and differing from the results arrived at by C. Grant,[43] Van Someren,[44] Gyldenstolpe,[45] and others.

1. *Colius m. macrourus.*—Senegal to Lake Chad (not known from south of the Upper Guinean savanna region) to Darfur, the Nile Valley, the northern half of Ethiopia, Bogosland, Eritrea, French and British Somaliland. *C. m. syntactus*[46] is a synonym. As has been pointed out by Zedlitz,[47] Oberholser proposed this name without having seen any Ethiopian material, but solely on the basis of Neumann's description of *pulcher*[48] in which Neumann, thinking that the type locality of *macrourus* was Ethiopia, correctly gave the differences between the birds of Kenya Colony and those from farther north. Oberholser showed that *macrourus* was described from Senegal, not Ethiopia, and not having any Senegalese birds to study,

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[42] Syst. Avium Ethiop., 1924, pp. 267–268.

[43] Ibis, 1915, pp. 405–406.

[44] Nov. Zool., vol. 29, 1922, pp. 71–72.

[45] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 262.

[46] Oberholser, Proc. U. S. Nat. Mus., vol. 28, 1905, p. 863: Abyssinia.

[47] Journ. f. Ornith., 1910, pp. 757–758.

[48] Idem, 1900, p. 190: Bura, Teita district, Kenya Colony.

considered *pulcher* a synonym of *macrourus* and suggested the name *syntactus* for the northeast African birds. Claude Grant[43] was the first to compare Senegalese and Ethiopian birds and found them identical, and correctly concluded that *pulcher* was valid and *syntactus* was not. Van Someren[44] found that Eritrean birds are paler than those from Ethiopia and assumed that the former were to be considered as *syntactus*. I have seen no Eritrean material and can not form an opinion on this question, but even if birds from there should be found to be separable, the name *syntactus* would not be

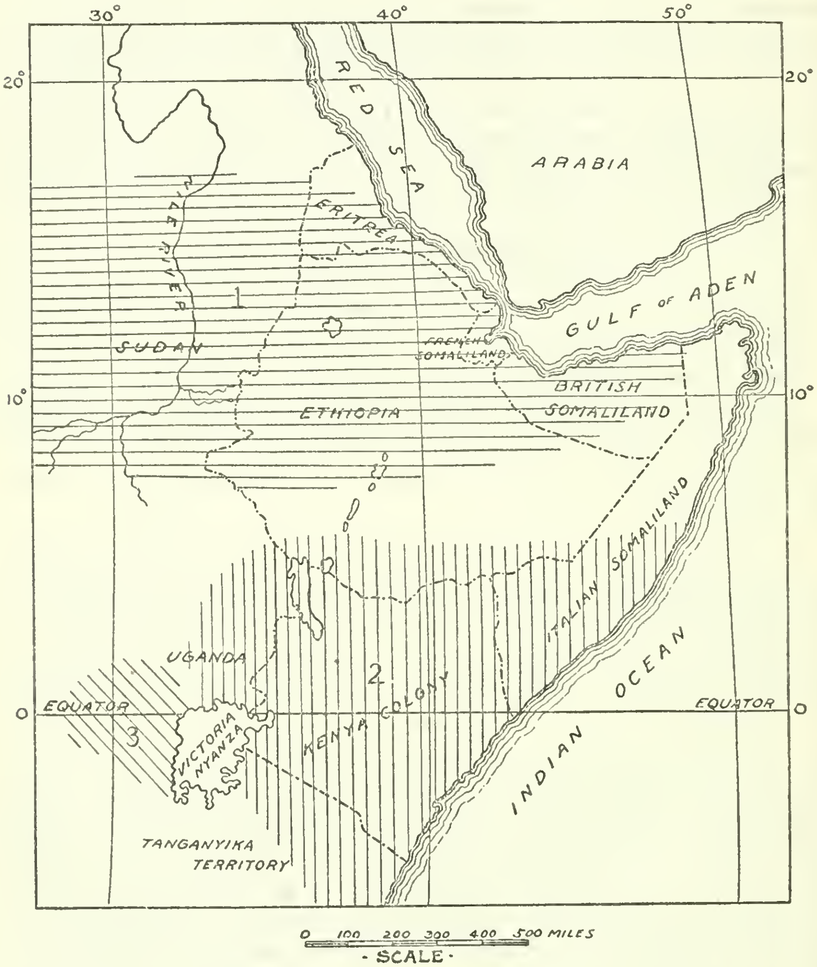

FIGURE 10.—DISTRIBUTION OF COLIUS MACROURUS IN NORTHEASTERN AFRICA 1, COLIUS MACROURUS MACROURUS; 2, COLIUS MACROURUS PULCHER; 3, COLIUS MACROURUS GRISEOGULARIS

available as it is definitely assigned to "Abyssinia." Van Someren also found that birds from south Ethiopia and Turkana to Uganda—

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[43] Ibis, 1915, pp. 405–406.

[44] Nov. Zool., vol. 29, 1922, pp. 71–72.

> * * * are pâler than typical *U. m. pulcher* and * * * have the throat and breast more pinkish than *U. m. macrourus*, but *not* so dark as in *U. m. pulcher.* The forehead, crest, and nape more brownish than typical race. The under side paler than *C. m. pulcher* and the upper side less bluish green—paler, and tinged with brownish. The nape patch is sky blue, not squill blue as in *C. m. pulcher.* It appears, therefore, that this race is intermediate between *C. m. syntactus* and *C. m. pulcher;* and as the type localities of these two are so widely separated, they may form another subspecies.

If we read into Van Someren's words the idea that the birds of southern Ethiopia and northern Kenya Colony are intermediate between north and central Ethiopian birds (true *macrourus*) and typical *pulcher* then I agree as to the intermediate character of the series from the intermediate area, but feel it unwise to name such a variable aggregate, especially since the two peripheral races are often difficult to identify. If, however, Van Someren was thinking in terms of his Eritrean "*syntactus*," and typical *pulcher*, then his "intermediates" are really nothing but typical *macrourus.* As far as the material examined in the present study indicates, the birds of the southern Shoan Lakes region and the Lake Rudolf country south to where Van Someren permits typical *pulcher* to wander, are, on the whole, nearer to that form than to *macrourus.*

2. *C. m. pulcher.*—Southern Ethiopia, northern Kenya Colony, and southern Somaliland (Italian) to Uganda and to central Tanganyika Territory. Sclater[42] does not include the last-named country in the range of this race, but I have seen material from as far south as Morogoro (Loveridge collection). This race is darker generally than the typical one, particularly on the upper parts which have an ashy wash lacking in *macrourus.* According to Grant this race is somewhat larger than *macrourus*, but this I can not affirm, as the appended measurements show.

3. *C. m. griseogularis.*—Western Uganda (Toro and Ankole Provinces) Ruanda, Urundi, to the Kivu district, Belgian Congo, south to the country north of Lake Nyasa. Similar to *C. m. pulcher* but darker, the crown grayer; the blue nape patch somewhat more silvery, the wings and mantle tinged more greenish, less bluish, and the throat and breast more grayish.

It should be borne in mind that all these races are based on average differences, and are therefore appreciable only in good series.

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[42] Syst. Avium Ethiop., 1924, pp. 267-268.

The measurements of the present series of *macrourus* are as follows:

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Ourso	♂	94. 5	239	14. 5	21. 0
Dire Daoua	♂	91. 0	------	15. 0	20. 0
Do	♂	92. 0	245	15. 0	21. 0
Do	♂	91. 0	225	14. 5	18. 0
Do	♂	91. 0	221	14. 5	20. 0
Do	♂	89. 5	248	15. 0	20. 0
Do	♂	91. 0	235	13. 5	18. 0
Do	♂	88. 0	208	14. 0	20. 0
Do	♂	90. 0	253	13. 5	20. 0
Sadi Malka	♂	93. 5	248	16. 0	20. 5
Do	♂	93. 0	257	15. 0	19. 0
Do	♀	91. 0	238	14. 5	19. 0
Dire Daoua	♀	91. 5	240	14. 0	18. 0
Do	♀	88. 0	205	14. 0	18. 0
Do	♀	86. 0	211	14. 0	19. 0
Do	------	90. 5	------	15. 0	19. 0

The typical race of the blue-naped coly occurs in the lowlands of Ethiopia, up to 7,000 feet (2,100 meters) in the higher country of the interior. Blanford[49] gives its altitudinal range as from about 2,000 feet (600 meters) or even lower to 5,000 or 6,000 feet (1,500 to 1,800 meters), " * * * entirely replacing the last species (*Colius striatus leucotis*) in the tropical, and to a great extent in the subtropical zone." Zedlitz[47] writes that it is a bird of the lowlands and the Acacia steppes, but he found it really common only in the Barca district.

Five of the specimens collected are in molting condition, the ecdysis affecting the rectrices in each case. The tail molt is centripetal, and does not begin until the new remiges are full grown. None of these birds shows any signs of body molt.

The breeding season in northeastern Africa according to Erlanger's observations[50] is in May. This agrees with what Lynes found in Darfur[51] where the bird is common. He obtained breeding females and newly fledged young in April and May, and found a nest with two eggs at Khartoum on June 5. Von Heuglin's statement that at Khartoum the nesting season occurs during the rainy season, lasting until the end of September, taken together with the above observations, indicates a rather prolonged breeding time—from April to September.

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[47] Journ. f. Ornith., 1910, pp. 757–758.

[49] Geol. and Zool. Abyss., 1870, pp. 318–319.

[50] Journ. f. Ornith., 1905, pp. 486–487.

[51] Ibis, 1925, p. 359.

COLIUS MACROURUS PULCHER Neumann

Colius macrourus pulcher NEUMANN, Journ. f. Ornith., 1900, p. 190: Teita.

Specimens collected:

One female adult, near Gardula, Ethiopia, March 29, 1912.

Three male adults, one unsexed, Gato River near Gardula, Ethiopia, April 12 to May 2, 1912.

One male adult, one female young, Bodessa, Ethiopia, May 25–27, 1912.

One male adult, one female adult, Tertale, Ethiopia, June 10, 1912.

Three female adults, Hor, latitude 3° 19′ N., Kenya Colony, June 28–30, 1912.

One female adult, Dussia, latitude 3° N., Kenya Colony, July 2, 1912.

One male adult, Lake Rudolf, Kenya Colony, July 6, 1912.

One male adult, 25 miles southeast Lake Rudolf, Kenya Colony, July 12, 1912.

One male young, Endoto Mountains, Kenya Colony, July 23, 1912.

One male adult, one female adult, Lekiundu River, Kenya Colony, August 8, 1912.

One male adult, Tharaka district, 2,000 feet, Kenya Colony, August 13, 1912.

Two male adults, one female adult, Tana River, camp 6, Kenya Colony, August 21, 1912.

Two adults, unsexed, no locality or date.

Soft parts: Of one adult male Mearns noted—iris dark red; naked space around eye and base of bill vinaceous red, bill with maxilla broadly tipped with black with narrow proximal border of blue; mandible black except sides of base; feet vinaceous anteriorly, flesh color posteriorly. While of another adult male, his notes read—iris hazel; bill red, broadly tipped with black; naked sides of face vinaceous; feet vinaceous; claws black. The juvenal males had dull red feet and green bills.

The range and characters of this race have already been discussed and need not be repeated here. The measurements of the birds collected are appended in tabular form.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Gato River near Gardula	♂	91. 0	------	14. 0	19. 0
Do	♂	91. 5	250	14. 0	20. 0
Do	♂	93. 0	------	15. 0	21. 0
Bodessa	♂	90. 0	235	14. 0	20. 0
Tertale	♂	87. 5	230	14. 0	19. 0
Kenya Colony:					
Lake Rudolf	♂	87. 0	230	14. 0	19. 0
25 miles south	♂	93. 5	250	15. 0	20. 0
Lekiundu River	♂	89. 0	220	14. 0	19. 0
Tharaka district	♂	91. 0	255	14. 0	19. 5
Tana River, camp 6	♂	90. 0	233	15. 0	20. 0
Do	♂	92. 0	275	14. 5	20. 5
Ethiopia:					
Near Gardula	♀	89. 0	200	14. 0	18. 0
Tertale	♀	90. 0	212	14. 0	19. 0
Kenya Colony:					
Hor, Latitude 3° 19′ N	♀	88. 0	230	13. 0	19. 0
Do	♀	88. 0	203	14. 0	19. 0
Do	♀	85. 5	202	13. 5	19. 0
Dussia, Latitude 3° N	♀	92. 0	222	14. 0	18. 5
Lekiundu River	♀	84. 0	203	14. 0	19. 5
Tana River, camp 6	♀	88. 0	213	14. 5	18. 5
Ethiopia, Gato River	------	89. 0	227	14. 5	18. 0
Do	------	96. 0	258	15. 0	20. 0
Do	------	89. 0	230	14. 5	20. 5

The present series exhibits the various plumages and molts of this coly, and inasmuch as but very little has been published on this subject, the following notes may be worth recording.

The juvenal plumage is like that of the adult but lacks the blue on the nape, has no bluish or greenish-blue sheen on the feathers of the upper parts, and has dull brownish gray lesser and middle upper wing coverts instead of ashy bluish-gray ones like the adults. The cheeks and auriculars are also slightly more buffy than in adult birds.

The postjuvenal molt is incomplete, the juvenal remiges and rectrices being unaffected. This molt is very prolonged and year-old birds usually present a rather curious appearance, having some worn, brownish feathers mixed with approximately an equal number of new, bluish-ashy ones on the back. The body molt is extremely irregular and is unusually difficult to detect as there are no body apteria to render more conspicuous the dropping of patches of feathers.

In adults, the wing molt usually precedes that of the tail feathers, but occasionally the two overlap. In the case of the remiges, the molt begins at the carpal joint and proceeds in both directions. When only the four outermost primaries remain to be molted and replaced, the outermost and the fourth are dropped more or less simultaneously. The tail molt, as in all colies, is centripetal.

Zedlitz[52] found this mouse bird to be not uncommon in southern Somaliland. At Salakle, southern Somaliland, Erlanger[53] obtained two young birds on June 6, a date which corresponds quite closely to Mearns' capture of two juvenal birds at Bodessa, southern Ethiopia, in late May, both of which, together, suggest that the nesting season in that general region must begin in March or very early in April.

Mearns recorded this mouse bird on many occasions. The following notes are taken from his diary. Abaya Lakes, March 18–26, 20 seen; near Gardula, March 26–29, 10 birds; Gato River, March 29 to May 17, 500; Bodessa and Sagon River, May 18 to June 6, 285; Tertale, June 7–12, 130; El Ade, June 12–14, 40; Mar Mora, June 15, 30 seen; Turturo, June 15–17, 40; Anole, June 17, 20 birds; Wobok, June 18, 50; near Saru, June 19, 50; Yebo, June 20, 10 seen; Karsa Barecha, June 21, 20 birds; Chaffa, June 23, 4 seen; Lake Rudolf, southeast, July 5–12, 850 birds; Indunumara Mountains, July 13–14, 400; plains at base and south of Endoto Mountains, July 21–24, 500; Er-re-re, July 25, 400; Le-se-dun, July 26, 300; Malele and district to the south for 45 miles, 300; Lekiundu River, August 8, 1,000; Meru, August 9, 50 birds; Tharaka district, August 12–13, 90 birds.

Order TROGONIFORMES

Family TROGONIDAE

APALODERMA NARINA NARINA (Stephens)

Trogon narina Stephens, in Shaw's Genl. Zool., vol. 9, p. 14, 1815: Anteniquoi, i. e., Knysna district (ex Levaillant).

Specimens collected:

One adult male, Dire Daoua, Ethiopia, no date, Cepharino collection.

One adult male, Botalo, Sidamo Province, Ethiopia, March 4, 1912.

One adult female, Aletta, Ethiopia, March 11, 1912.

One adult male, Loco, Ethiopia, March 13, 1912.

Two immature males, one adult female, one immature female, Bodessa, Ethiopia, May 23–31, 1912.

One adult female, Equator, Meru Forest, Kenya Colony, August 9, 1912.

Soft parts: Immature male, iris brown; bill olivaceous black, tipped on both mandibles with horn color, yellow at base below and on sides; feet brownish flesh color. Immature female, iris brown;

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[52] Journ. f. Ornith., 1915, pp. 21–22.

[53] Idem, 1905, p. 486.

bill green, yellow on basal half of mandible and on sides of maxilla at base; feet and claws brownish flesh color.

The narina trogon occurs over most of Africa south of the Sahara, and has been differentiated into three currently recognized forms. I have examined a series of 25 skins representing two of the three subspecies (of *constantia* no material has been available). The ranges and characters of the races are as follows:

1. *A. n. narina.*—Eritrea, northern Somaliland, Ethiopia, the adjacent parts of the Anglo-Egyptian Sudan west to the Nile, and south through the drainage area of the Bhar el Ghazal to the Ubangi River, south to the northern boundary of the Congo Forest; south through northern and eastern Uganda, Kenya Colony, Tanganyika Territory, the Katanga, and Angola to the Cape Province, omitting the Kalahari region, Ovampoland, Namaqualand, Damaraland, the Southwest African Protectorate, the Orange Free State, and the western part of the Cape Province; in forested areas only throughout its range.

2. *A. n. brachyurum.*—The equatorial rain forest; from southern Cameroon and Spanish Guinea eastward through the Belgian Congo to the Buddu Kingdom in Uganda, the Kivu country and the west bank of the northern part of Lake Tanganyika. This race is similar to the typical one but smaller (according to Chapin,[54] the wing measurements of *brachyurum* are 122–136 (male), 122–136 (female) as against 129–145 (male) and 128–144 millimeters (female) in *narina*); also the adult female lacks the cinnamon wash on the breast found in *narina*, but has this area gray with greenish reflections. In his review of the races of this trogon, Chapin [54] definitely shows the range of *brachyurum* to extend as far east as Entebbe, Uganda. Van Someren [55] records specimens from Bugoma, Budongo, and other western Uganda forests, but writes that he can not detect any differences between males from east Africa and Uganda, and those from the type locality in South Africa. He seems not to have compared East African birds with others from Uganda, however.

3. *A. n. constantia.*—Liberia to Calabar. Similar to *brachyurum* in size, but said to lack the bronze-green edges on the greater upper secondary coverts and on the secondaries; the male with these feathers lighter, the whitish vermiculations broader and more numerous than in *brachyurum*.

The series available for study illustrates the sequence of plumages of this bird.

The juvenal plumage, which is alike in both sexes is as follows: Upper parts: Head, nape, scapulars, interscapulars, back, rump, and upper tail coverts green, more golden, less pure green than in adults, the feathers of the forehead and lores being tawny buff, terminally banded with green, giving them a brown and green barred appearance, the inner greater and middle upper secondary coverts with large buffy white terminal spots terminally narrowly margined with green, some of the feathers finely barred with buffy white on their basal portions, the rest of the upper wing coverts fuscous black, either wing with a green margin, or (especially the greater primary coverts) with a slight greenish sheen, none with anything resembling the white and dark gray vermiculations characteristic of the adults; remiges plain fuscous brown except the innermost secondaries which are finely mottled with buffy and greenish on the outer webs; rectrices as in adult. Under parts: Chin, throat, and breast buffy tawny; belly and flanks and under tail coverts whitish, many of the feathers somewhat buffy, all of them dusky gray basally. One of the Bodessa males is molting from this plumage into the immature stage and presents a rather curious appearance, particularly on the underside where new feathers are coming in on the breast and abdomen. The new throat and breast feathers are tawny, fairly broadly tipped with green, whereas these feathers in adults are green for all except a small basal fuscous portion, the green area being four or five times as wide as in immature birds. As a matter of fact in the immature plumage these feathers are really tricolored, being gray at the extreme base, then tawny, then green. The new feathers growing out on the abdomen are red, but paler than in adults, and those on the anterior part of the belly are definitely, but narrowly and not distinctly, barred with dark brownish.

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[54] Amer. Mus. Nov., no. 56, 1923, pp. 3–4.

[55] Nov. Zool., vol. 29, 1922, p. 72.

The immature plumage resembles the adult type except for the above mentioned differences in the feathers of the underparts and the fact that the upper wing coverts are dark fuscous, not vermiculated with white. Occasionally some of the juvenal upper wing coverts may persist even into the first adult plumage, but it may be that such cases (where white spots are present on these feathers) are due to albinistic tendencies rather than to the persistence of juvenal feathers. The female from Aletta is a case in point. The middle upper wing coverts have conspicuous white spots, but these feathers are new, not worn. Immature birds average somewhat more golden, less bluish green above than adults, but inasmuch as adults vary somewhat among themselves in this respect, it is difficult to be very definite in this statement.

Van Someren[55] writes that, "* * * young birds, after passing through the spotted plumage, assume a plumage like that of the female, but differ in having pale terminal spots to the lesser coverts and occasionally on the secondaries. It is not until the third plumage that the red underside is assumed." As has been noted above, the red begins to appear in the postjuvenal molt, so it appears that the reason for the discrepancy between Van Someren's account of the plumage sequence and mine is due to the fact that Van Someren mixed juvenal and year-old birds.

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[55] Nov. Zool., vol. 29, 1922, p. 72.

The postjuvenal molt is complete; the tail molt is centrifugal.

Aside from the specimens collected, Mearns noted this trogon at the following places: Aletta, March 7–13, 2 seen; Bodessa and Sagon River, May 19 to June 3, 7 birds; Meru and Kilindini, August 9–10, 10 seen.

Order CORACIIFORMES

Family ALCEDINIDAE

CERYLE RUDIS RUDIS (Linnaeus)

Alcedo rudis LINNAEUS, Syst. Nat., ed. 10, vol. 1, p. 116, 1758: Egypt (from Hasselquist).

Specimens collected:

Two males, Sadi Malka, Ethiopia, January 28, 1912.

One female, Athi station, Uganda Railway, Kenya Colony, September 1, 1912.

A series of 40 specimens from various parts of Africa and Asia Minor exhibits considerable size variation, but nothing of geographical or racial significance. The following are the size limits of this series:

Males.—Wing 128–144; tail 70–80.5; culmen from base 50–62 millimeters.

Females.—Wing 130–43; tail 71–80; culmen from base 54–63 millimeters.

Hartert [56] writes that South African birds may be found to average larger than those from the rest of the continent in which case Strickland's name *varia* would be available for them. However, the largest specimen examined is not from South Africa, but from Tanganyika Territory, and the few South African birds seen are not particularly large. Gyldenstolpe [57] has also gone into this matter and finds that southern birds can not be separated from more northern ones.

This kingfisher is entirely piscivorous and its distribution is accordingly interrupted by arid, streamless regions. It is widely distributed in Ethiopia, Eritrea, Somaliland, and Kenya Colony (to consider only the area represented by the present collection) but is not found away from water. During the rainy season when many otherwise dry river beds are flooded, it might be thought that the birds would wander about, but this is not the case. It appears that many of these periodic streams contain but little fish life and therefore offer little attraction to the kingfishers. However, Von Heuglin found that when the Nile and its tributaries overflowed, these birds seemed to move about in numbers from their nesting areas. It is quite likely that many river fish are breeding at this time and come into shallow spots where they are more accessible to the kingfishers, and also the discoloring of the water may have some effect.

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[56] Vög. pal. Fauna, vol. 2, p. 878.

[57] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 275.

In Egypt the breeding season begins as early as December according to Adams; in Uganda and Kenya Colony it does not seem to be definitely restricted to the period of the heaviest rains as Van Someren[58] found the birds nesting in June, August, September, November, and December.

Blanford[59] records seeing this bird at about 7,000 feet (2,100 meters) above the sea, an unusually high elevation. He notes that the species was rare in the country he traversed, "* * * doubtless in consequence of the few large streams."

Besides the specimens collected, Mearns observed this bird as follows: Tana River, August 15, 4 birds; Thika River, August 27, 2 seen; west of Ithanga Hills, August 28, 10 birds; Athi River, August 31, and September 1, 10 birds seen.

MEGACERYLE MAXIMA MAXIMA (Pallas)

Alcedo maxima PALLAS, Spic. Zool., fasc. 6, p. 14, 1769: Cape of Good Hope.

Specimens collected:

One male, two females, Duletcha, Ethiopia, January 24, 1912.
One male, Gato River near Gardula, Ethiopia, April 1, 1912.

This species has two geographical forms, the typical one occurring in all of Africa south of the Sahara Desert, except the West African forest region, and a western forest race, *sharpii*—characterized by the absence of white spots on the feathers of the interscapulars and upper back, and the reduction of them elsewhere in the upper parts, and by the slate-gray bars on the abdomen of the male. This form inhabits the West African forest area from Cameroon to the Ituri and Uele districts of the Belgian Congo. According to Sclater[60] intermediate birds occur in the region from northern Angola to Upper Guinea. There is some doubt as to the name of the western race. Swainson[61] described it as *Ispidina gigantea* and gave Senegal as the type locality. From the geographical data the name would appear to be a straight synonym of *maxima*. However, Reichenow[62] calls attention to the fact that Swainson's description applies without doubt to the form without spots on the back, and that the locality on the type specimen was probably wrong. While it is true that the plate shows the nape, interscapulars, and upper back to be unspotted, and in the description it is stated that the, "* * * general colour above is dark cinereous, thickly covered with white spots, these spots are thickest on the wing and nearly obsolete on the back * * *," the abdomen is shown to be white with only a few slate-gray bars on the flanks. In the character of spotting it agrees more with *sharpii*, in the color of the venter with *maxima*, while the locality, whether right or wrong, is stated to be Senegal which is known to be inhabited by *maxima*. So then it seems to reduce itself to two arguments in favor of *gigantea* being the typical form to one against it. It may well be that the actual specimen came from Upper Guinea and was intermediate in character. It seems, from the above, that *gigantea* is a synonym of *maxima* and not a distinct form with *sharpii* as a synonym. Miller[63] does not discuss the name *gigantea* but uses *sharpii* for the western forest race. He writes that in this form the "* * * belly is heavily marked with slate color but it is never rufous." This applies to adults only as young males have the underparts as in adult females except that they have the breast spots rufous as well and not black. In the collections of the Museum of Comparative Zoölogy there is a young male from Sakbayeme, Cameroon (G. Schwab collection) which is in postjuvenal molt. It has enough of the juvenal feathering still left to show some apparently unrecorded features of the first pennaceous plumage. In the juvenal stage the upper wing coverts, interscapulars, scapulars, and anterior part of the crown (if not most of the upper parts) are similar to those parts in the adults but the feathers are spotted terminally with light rufous chestnut. The underparts (as has already been mentioned) resemble those of the adult female but the pectoral spots are all rufous brown. The new (black) pectoral feathers and those of the sides of the throat are growing in in this specimen and all have the black area narrowly tipped with rufous brown, particularly on the breast, and progressively less from there to the sides of the throat and to the chin.

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[58] Ibis, 1916, p. 246.
[59] Geol. and Zool. Abyss., 1870, p. 325.
[60] Syst. Avium Ethiop., 1924, p. 211.
[61] Birds W. Afr., vol. 2, 1837, p. 93, pl. 11.

The new dorsal feathers in this bird are somewhat more spotted than in a fully adult female from the same place, a fact which suggests that the spotting becomes reduced with successive molts. This also holds for the typical subspecies.

The size variations of this species (11 specimens only examined) are shown in the following table. It may be that more material will indicate that South African birds have on the average longer bills than those of tropical and northeastern Africa. The western race, *sharpii*, appears to be slightly smaller than *maxima*.

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[62] Vög. Afr., vol. 2, p. 299, footnote.

[63] Bull. Amer. Mus. Nat. Hist., vol. 31, 1912, pp. 296–297.

Locality	Sex	Wing	Tail	Culmen from base
Ethiopia	♂	202. 0	117	91. 0
Do	♂	199. 0	117	-------
Tanganyika Territory	♂	194. 0	117	91. 0
South Africa	♂	194. 0	112	93. 0
Do	♂	196. 0	117	92. 0
Cameroon (*sharpii*)	♂	193. 0	115	82. 5
Ethiopia	♀	202. 0	121	88. 5
Do	♀	202. 0	120	88. 0
Tanganyika Territory	♀	197. 0	116	86. 5
South Africa	♀	208. 0	121	95. 0
Cameroon (*sharpii*)	♀	188. 5	110	85. 0

The measurements given by Reichenow [62] for the species (both races together) are similar except that according to him the tail varies from 120 to 135 while I find a range from 112 to 121 millimeters. Also, his bill measurements have a higher upper limit than mine (85–100 millimeters).

Although the giant kingfisher occurs throughout all of the region represented by the present collection, it is noticeably scarcer in Ethiopia and Eritrea than in the equatorial and southern parts of its range. Neumann did not meet with it in his journey through Shoa, and Erlanger obtained but two examples. The latter author writes [64] that this species was by no means common in the region traversed by him. Further evidence of its scarcity may be construed from the fact that neither Rüppell nor Blanford mention it, although Von Heuglin met with it in east Sennar. It seems to be fairly uncommon in the Anglo-Egyptian Sudan as well. Sclater and Praed [65] write that they have seen but three Sudanese examples, although Butler records it as not uncommon along the rivers of that country. Lynes [66] did not find it in Darfur.

The reason for its relative scarcity in the northern parts of its range is ecological. The giant kingfisher is entirely piscivorous and therefore restricted to the vicinity of water. Furthermore it does not occur except where the stream banks are wooded, a condition which eliminates a good percentage of the smaller streams. It is not nearly as wide ranging as *Ceryle rudis* which occurs chiefly around nonwooded streams, ponds, and open marshes.

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[62] Vög. Afr., vol. 2, p. 299, footnote.

[64] Journ. f. Ornith., 1905, p. 445.

[65] Ibis, 1919, p. 668.

[66] Idem, 1925.

ISPIDINA PICTA PICTA (Boddaert)

Todus pictus Boddaert. Table Pl. Enlum., p. 49, 1783: "Judia," i. e. St. Louis, Senegal (ex Buffon, Oiseaux, vol. 7, p. 229, 1780).

Specimens collected:

Male, Sadi Malka, Ethiopia, December 21, 1911.

Male, Gardula, Ethiopia, March 27, 1912.

Male, near Gardula, Ethiopia, March 28, 1912.

Male adult, female immature, female adult, one unsexed, Gato River near Gardula, Ethiopia, April 25 to May 13, 1912.

Soft parts: Bill black, slightly tipped with white; feet salmon, claws brown.

The pygmy kingfisher is widely distributed in Africa from Senegal, the Sudan, Ethiopia, Bogosland, and Somaliland, south to Angola, the eastern part of the Cape Province, and to Natal and Pondoland. Throughout this area it breaks up into two races, a southern form with a blue auricular spot (*natalensis*), ranging north to Nyasaland and southern Tanganyika Territory (one record from Dar es Salaam and one Ruanda record) and the typical subspecies, occupying the rest of the range. The distributional data given by Sclater[67] are very incomplete, as no indication is given of the occurrence of *I. picta* in Ethiopia, Bogosland, Eritrea, and Somaliland, although not only did Rüppell record it in the first-named country, Jesse in the second, Blanford in the third, and Zedlitz in the last, but Sharpe included all but the last of these records in his account of the species in his monograph of this family of birds. The colored plate (No. 51) in that work, said to represent a West African skin has the upper parts of the body too blue and not violet enough. I have examined 25 specimens of the typical form and find that West African birds (Cameroon material only seen) have the back and wings deeper, more violaceous than birds from elsewhere, although closely approached by specimens from the Belgian Congo. Two from Kenya Colony and three from Uganda are the palest, least violaceous, while those from Ethiopia are intermediate between the latter and those from the Congo. Of the southern form, *natalensis*, I have seen but one—from Natal. It is noteworthy that Gyldenstolpe,[68] who obtained a specimen in the Kigezi district, Ruanda, found it differed from typical *natalensis* material in having the color of the back and especially the rump and upper tail coverts brighter, and the spots at the ends of the wing coverts brighter, more greenish silvery cobalt. It would appear (assuming this difference to be more than individual in character) that the two races vary in opposite directions geographically, *picta* getting darker, while *natalensis* gets lighter above from east to west. On the other hand it may be better to consider Gyldenstolpe's bird as aberrant, as Van Someren [69] records a specimen of *picta* from Bugoma, Uganda, with a light blue back, not dark blue as in the others.

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[67] Syst. Avium Ethiop., 1924, p. 213.

[68] Kungl. Sv. Vet. Akad. Handlgr., 1924, pp. 276–277.

The immature male has a black bill and has the back and rump lighter. less violet, more bluish than the adults.

The size variations are as follows:

Males.—Wing 50–55 (52); tail 23–28 (25); culmen from base 8–8.5 (8.1) millimeters.

Females.—Wing 48–54 (51.5); tail 24–26 (25); culmen from base 7–8 (7.9) millimeters.

In the northeastern part of its range this little kingfisher appears to be less common than in the tropical portion of its distributional area. Thus, Blanford [70] writes that it "* * * was not very unfrequent in the Anseba Valley * * *. It was not seen elsewhere." Neumann [71] records but one pair in his report of his expedition. Erlanger,[72] on the other hand, met with this species in several localities, all in well-watered valleys. Zedlitz [73] found it but once in southern Somaliland.

But little is known of the nesting season of this bird in Ethiopia. Blanford [70] shot a young bird, apparently just out of the nest, on July 30. "A few days later, in the evening, a pair of adult birds were observed keeping about one spot, as if they had a nest there. The nest, however, could not be found." On May 13 Mearns collected a pair at Gato River, near Gardula. In his field notes he records that the two birds were seen together beside their nesting burrow.

Mearns noted several of these kingfishers at Sadi Malka, one at Lake Abaya, March 19; 4 near Gardula, March 26–29; and 10 at Gato River, March 29 to May 17.

HALCYON ALBIVENTRIS ORIENTALIS Peters

Halcyon orientalis PETERS, Journ. f. Ornith., 1868, p. 134: Inhambane.

Specimens collected:

Male, immature, and female, immature, Tana River at mouth of Thika River, Kenya Colony, August 26, 1912.

The brown-hooded kingfisher occurs throughout southern and eastern Africa from the Cape Province to southern Somaliland. The birds decrease in size from the southern to the northern part of the range, and have been divided on this basis into three currently recognized forms. The typical race, with a wing length of from 105–110 millimeters, is found only in South Africa, intergrading with the next in Southern Rhodesia and southern Mozambique. The tropical East African form, *orientalis*, with wings 96–105 millimeters long, occurs from the northern limits of the typical race, through Rhodesia, the Katanga, Lower Congo, Angola, Nyasaland, Mozambique, Tanganyika Territory, and Kenya Colony to as far north as Kanyakeni (south of Meru). The northernmost of the three races, *erlangeri*, is definitely known only from southern Somaliland. It has a wing length of from 92–97 millimeters. Granvik[74] records three birds from Mombasa as *erlangeri*, but gives the wing lengths as 98 millimeters for the male and 95–96 millimeters for the two females. The first is obviously within the variational limits of *orientalis*, and the others are close to it. Furthermore, he admits that all three birds were in molt when shot. While it is not stated whether the remiges (and consequently the wing measurements) were affected by the molt, this uncertainty, together with the fact that van Someren[75] and others record *orientalis* from Mombasa, suggests that Granvik's birds are also *orientalis*.

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[69] Nov. Zool., vol. 1922, p. 79.

[70] Geol. and Zool. Abyss., 1870, pp. 323–324.

[71] Journ. f. Ornith., 1905, p. 190.

[72] Idem, p. 450.

[73] Idem, 1915, p. 29.

I have examined a series of 17 *orientalis* and 10 *albiventris* and find the size distinctions to hold fairly well. Likewise, the latter differs from the former in having the pectoral area more streaked with black. The size limits of *orientalis* and *albiventris* overlap more than has hitherto been thought. The present immature male from the Tana River is the largest example of *orientalis* examined and exceeds in size any recorded measurements. It has a wing length of 107 millimeters, tail 69 millimeters, culmen 46 millimeters. The female is considerably smaller—wing 101 millimeters, tail 64 millimeters, culmen 43 millimeters. The overlapping in size of *erlangeri* and *orientalis* is also greater than has been supposed. A male adult from Dar es Salaam, in the Museum of Comparative Zoölogy, has a wing length of only 93 millimeters, but a female taken at the same time has a wing 98 millimeters long. The eastern form *orientalis* is really nothing but an intermediate race bridging the gap between *albiventris* and *erlangeri*. As intermediate forms go, it is quite distinct.

Immature birds have the feathers of the throat and breast terminally edged with earth brown, giving the pectoral region a somewhat scalloped appearance. This is better developed in *albiventris* than in *orientalis*, and in the former this scalloping is continued down the sides and upper flanks.

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[74] Journ. f. Ornith., 1923, Sonderheft, p. 104.

[75] Nov. Zool., vol. 29, 1922, p. 76.

Laubmann[76] has investigated the order of the molt of the remiges in the genus *Halcyon* and finds that there are two centers from which the molt spreads, a proximal one beginning with the first, or innermost primary, and a distal one beginning with the seventh and spreading to the outermost one. An adult male collected at Kilosa, Tanganyika Territory, on December 24, molting the remiges, indicates that there are three such centers, the two that Laubmann mentions, and a third beginning with the next to the innermost secondary and extending from that point proximally to the tertials. The distal primary center does not become involved in the molt as early as the other two.

This species is found in the Acacia savannas far from water as well as along the streams and coastal belts. Insectivorous in diet, it is not confined to the vicinity of water, and is therefore more widely dispersed than are the piscivorous species, such as *Ceryle rudis* and *Megaceryle maxima*.

But little has been published concerning its nesting season. Boyd Alexander found that on the Zambesi the breeding season began in November. Recently Loveridge[77] recorded a nest with four eggs at Dar es Salaam on November 6. The nest was at the end of a burrow about three and half feet long, and about a foot and a half below the surface. The actual nest itself was a small collection of finely broken mollusk shells and beetle elytra.

HALCYON LEUCOCEPHALA LEUCOCEPHALA (Müller)

Alcedo leucocephala P. L. S. MÜLLER, Syst. Nat. Suppl., p. 94, 1776: Senegal.

Specimens collected:

Three males, Ourso, Ethiopia, September 7 to October 25, 1911.

One female. Chaffa, upper village, Kenya Colony, June 25, 1912.

One male, Tana River, camp No. 6, Kenya Colony, August 21, 1912.

One female, Tana River at mouth of Thika River, Kenya Colony, August 24, 1912.

One female, 9 miles up the Thika River, Kenya Colony, August 27, 1912.

One male, 20 miles up the Thika River, Kenya Colony, August 27, 1912.

One male and one female, Thika River at Bowlder Hill, Kenya Colony, August 28, 1912.

Soft parts: Bill and feet, entirely red; iris and claws, brown.

The systematics of the gray-headed kingfisher have been rendered very complicated by the variety of conclusions that have been reached and followed by various workers. The reasons for this great diversity of opinion are two—first, that two distinct but related species were for a long time considered conspecific, and second, that both are variable. The resulting difficulty of studying two variable entities erroneously considered as a single specific aggregate will readily be apparent. Neumann[78] recognized four forms—*semicaerulea* of West Africa, northeast Africa, and Arabia, *centralis* of Masailand, *hyacinthina* of Zanzibar, southern Tanganyika Territory and Nyasaland, and *swainsoni* of Angola, South Africa, and East Africa as far north as the interior of Nyasaland and Uhehe. Erlanger[79] separated Senegalese birds from Abyssinian ones and called the former by Swainson's name *rufiventris*, the latter *semicaerulea*. He makes no mention, direct or indirect, of *centralis*, and questions the validity of *hyacinthina*. Reichenow[80] first recognized *swainsoni* as specifically distinct, but he admitted three forms of *semicaerulea*—the typical northeast African one, which, according to him extends south to the Pangani River, the West African *rufiventris*, and violet-winged *hyacinthina*. Zedlitz[81] combined *rufiventris* with *semicaerulea* and considered *centralis* a synonym of *hyacinthina*, giving to the latter the range of "East Africa," and recognized *swainsoni* as a southern subspecies of *semicaerulea*.

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[76] Verh. Orn. Ges. Bayern, vol. 15, 1923, pp. 383–387, and vol. 16, 1924, pp. 184–186.

[77] Proc. Zool. Soc. Lond., 1928, p. 73.

In 1915 Claude Grant[82] reviewed the group with the aid of the material in the British Museum and decided that there were six valid races. He restricted the name *semicaerulea* to the Arabian birds and resurrected the older name *leucocephala* for the whole species. Both *centralis* and *rufiventris* he disposed of as synonyms of *leucocephala;* he described[83] a new race *ogilviei* from Angoniland intermediate in character between *leucocephala* and *swainsoni*; and recognized *swainsoni* of southern Africa and *acteon* of the Cape Verde Islands. With the latter he synonymized *erythrorhynchus* Gould as had been done by Pucheran and Hartlaub some 60 years before. *Hyacinthina* he retained but said that he had seen no material. Seven years later Van Someren[84] showed that the name *swainsoni* was not applicable to the pale-bellied southern birds but was a synonym of *leucocephala*. As a matter of fact, Ogilvie-Grant[85] first pointed this out, but Claude Grant apparently overlooked it. Van Someren revived the name *pallidiventris* for the pale-bellied birds and showed that they were specifically distinct from *leucoce-*

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[78] Journ. f. Ornith., 1905, p. 190.

[79] Idem, p. 446.

[80] Vög. Afr., vol. 2, pp. 276–279.

[81] Journ. f. Ornith., 1910, p. 766.

[82] Ibis, pp. 265–267.

[83] Bull. Brit. Orn. Cl., vol. 35, 1914, p. 28.

[84] Nov. Zool., vol. 29, 1922, pp. 76–78.

[85] Trans. Zool. Soc. Lond., 1910, p. 437.

phala. He again separated Senegambian birds from Abyssinian ones, describing the latter under the name *ugandae* (southern Ethiopia, Somaliland, Lake Rudolf district, and Uganda) and supported the validity of *centralis.* He then split *pallidiventris* into three races, the typical South African, *ogilviei* of Nyasaland, and a new one, *kivuensis*, of the central-lakes district. Finally, to bring this historical summary to a close, Sclater [86] rejected *centralis* and *ugandae*, reverted to the name *swainsoni* which he treated as a race of *leucocephala*, and synonymized *ogilviei* with *swainsoni.* This brief account is by no means complete but merely serves to show how definitely the literature was confused and how hopeless the task of straightening out the taxonomics of the group seemed to be.

In the present study I have examined the combined series of the Museum of Comparative Zoölogy, the United States National Museum, the American Museum of Natural History, the Field Museum, and the Cleveland Museum, totaling in all some 220 specimens from the following localities—Ethiopia, French Somaliland, British Somaliland, Arabia, the Sudan, Senegal, Cameroon, Cape Verde Islands, the Belgian Congo, Uganda, Kenya Colony, and Tanganyika Territory. The conclusions I have reached are as follows:

There are two species—*leucocephala* and *pallidiventris* which occur together over a considerable part of their ranges, the former being on the whole more northern, the latter more southern in distribution. Of *pallidiventris* there are no valid geographical forms. Of *leucocephala*, the following races are recognizable—the typical one ranging from Senegal and Cameroon east to Ethiopia, Somaliland, Kenya Colony, and north central Tanganyika Territory; *acteon* of the Cape Verde Islands; *semicaerulea* of southwestern Arabia; and *hyacinthina* of the coastal strip of east Africa from Djibouti south to south-central Tanganyika Territory, thence inland to Nyasaland. I consider *centralis* and *ugandae* synonyms of *leucocephala*. and *ogilviei* a synonym of *hyacinthina*, not of *pallidiventris* as Sclater [86] indicates.

Because of the richness of the material examined I feel justified in going into greater detail at this point.

1. *Halcyon pallidiventris.*—This species resembles *leucocephala* but has the abdomen very much lighter—chestnut tawny instead of deep rufous brown, and the remiges, lower back, and rectrices always violaceous, never bluish in color. I have seen no typical Angolan material, but Van Someren's form *kivuensis* does not seem to have any characters to define it. His taxonomic procedure in this case is very poor. On page 77 he lists *H. p. kivuensis* as a race of *pallidiventris* and gives as its range "North Tanganyika, Kivu, Albert

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[86] Syst. Avium Ethiop., 1924, pp. 216–217.

Edward, and South Victoria Nyanza." On the following page he lists specimens from Kendu Bay south of Speke's Gulf, in Tanganyika Territory, and from South Ankole in Uganda as "*H. pallidiventris*(?) subsp. nov.," and then goes on to say that these birds belong," * * * to the smaller, pale-bellied, violet-winged birds of the central lake district which I have named above * * *. The birds collected by the Ruwenzori expedition belong to this race." This is all there is by way of a description; no type or type locality is mentioned, and Hartert does not include the type of *kivuensis* in his list of the types of birds in the Tring Museum. A series of 17 specimens of *pallidiventris* from points as widely separated as Kilosa, Tanganyika Territory, and Luluabourg on the Kasai show no differences, and it therefore appears highly improbable that *kivuensis* is valid.

Sclater,[86] in defense of his action in considering *pallidiventris* a race of *leucocephala*, writes that it occurs south of the Zambesi only in the rainy season (October to March), and in the southern winter (April to September) to the Semliki River and the Ruwenzori Mountains. In this he is mistaken as I have seen undoubted examples of *pallidiventris* from tropical East and Central Africa taken in every month except February. Furthermore, a female taken on August 3 at Medje, northern Belgian Congo, by J. P. Chapin had the ovary slightly enlarged. (However, Chapin informs me that *pallidiventris* does not breed north of the Congo forest.)

This species ranges farther north than most writers state. In Kenya Colony (from which country it does not appear to have been previously recorded) it is known from Kisumu and Kenna Tana (specimens in Museum of Comparative Zoölogy), and in the Belgian Congo as far north as Medje.

Van Someren considers *ogilviei* a race of *pallidiventris* and Sclater treats it as a synonym of the latter. However, in the original description it is said to differ from *leucocephala* in having the wings and tail almost pure violet as in *pallidiventris*, and from the latter in having the belly dark deep chestnut as in *leucocephala*. If the color of the wings and tail is to be taken as the specific character then both Van Someren and Sclater are inconsistent in considering *hyacinthina* a form of *leucocephala*. Furthermore, if we use the remigial and rectricial color as a specific criterion we are left with the problem of dark-bellied and light-bellied birds occupying the same area. It seems therefore that *ogilviei* is to be considered the same as *hyacinthina* rather than *pallidiventris*.

2. *Halcyon leucocephala leucocephala.*—I can see no great advantage in separating Senegalese from Ethiopian and Kenian birds. However, I have seen but one specimen from Senegal and only one

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[86] Syst. Avium Ethiop., 1924, pp. 216–217.

from Cameroon, so the typical material examined has been decidedly limited. However, Sclater, Bannerman, and others, who have seen adequate Senegalese series have kept them united with Abyssinian and Kenian birds. Van Someren,[87] on the other hand, writes that Senegal birds are quite distinct from Uganda and East African ones. If this should be taken as convincing evidence, then the name *centralis* Neumann would have to be used for the eastern birds. Van Someren does not state whether he compared the Senegal birds with Abyssinian ones (which he calls *ugandae*), but I can not separate Ethiopian from Kenian and Tanganyikan and Sudanese birds. However, Van Someren appears to have forgotten that males have darker bellies and the blue of the wings and tail less greenish than females. and to have compared Senegalese females with eastern males.

3. *Halcyon leucocephala acteon.*—A series of 69 specimens supports the validity of this rather larger, island form. The coloration is quite variable, but the larger size is a good character. The head and neck average whiter than in *leucocephala*.

4. *Halcyon leucocephala semicaerulea.*—The Arabian form is characterized by its very dark belly and the violet tinge on the cobalt-blue remiges and rectrices. In northern Ethiopia the typical form approaches this one. In this race there is no sexual difference in color.

5. *Halcyon leucocephala hyacinthina.*—The range of this race is more extensive than hitherto thought. It occurs along the coastal strip of eastern Africa from Djibouti, French Somaliland to the Pangani River, Tanganyika Territory, thence inland through southern Tanganyika to Nyasaland. The name *ogilviei* is a synonym. The Djibouti record (specimen in Field Museum) may be a migrant.

Mearns recorded this kingfisher at the following places: Chaffa villages, June 24–25, 1 bird; plains at base and south of Endoto Mountains, July 21–24, 4 seen; Northern Guaso Nyiro River, July 31 to August 3, 8 birds noted; Tana River, August 22, 3 seen; junction of Tana and Thika Rivers, August 23–26, 20 noted; Thika River, August 27, 20 birds observed; west of Ithanga Hills, August 28, 20 seen; Athi River, August 29 to September 1, 22 noted.

HALCYON CHELICUTI CHELICUTI (Stanley)

Alaudo chelicuti STANLEY, in Salt's Voy. Abyssinia, App., p. lvi, 1814: Chelicut, Abyssinia.

Specimens collected:

Three male adults and five female adults, Dire Daoua, Ethiopia, December 6–15, 1911.

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[87] Nov. Zool., vol. 29, 1892, p. 76.

One female adult, Iron Bridge, Hawash River, Ethiopia, February 4, 1912.

One male adult and two female adults, Hawash River, Ethiopia, February 11–12, 1912.

Five male adults, Gato River near Gardula, Ethiopia, March 31 to May 11, 1912.

Three male adults and one female adult, Bodessa, Ethiopia, May 27, 1912.

Two female adults, Lekiundu River, Kenya Colony, August 6, 1912.

Two female adults, Bowlder Hill, Thika River, Ethiopia, August 28, 1912.

Soft parts: Bill, black, red on basal half of mandible.

Sclater [88] lists but two forms of this kingfisher—the typical one, and *eremogiton.* However, Hartert, when describing the latter,[89] separated the South African birds under Strickland's name *damarensis*, a point which Sclater does not mention. More recently Grote [90] has proposed the name *hylobius* for the birds of the central African forest region from Cameroon, the Congo, and Angola, east to Lakes Tanganyika and Nyasa, and probably to the interior of Tanganyika Territory. While this race is admittedly only an intermediate form, bridging the gap between *chelicuti* and *damarensis*, and therefore rather difficult to define, it seems to have no existence as an entity in nature. I propose to recognize three races, as follows:

1. *Halcyon chelicuti chelicuti.*—From Gambia, Senegal, and Anglo-Egyptian Sudan and Ethiopia, south to northern Angola, the northern part of Northern Rhodesia, Nyasaland, and central Mozambique.

2. *Halcyon chelicuti eremogiton.*—Arid portions of Northern Nigeria from Zinder to the Lake Chad district. This form, which I have not seen, is said to differ from the typical race in being paler, especially on the scapulars and upper wing coverts and in having a somewhat slenderer bill. Gyldenstolpe [91] suggests that although he has not seen any material of this race—

> * * * the character of a more slender bill does not seem to be of any use for separating subspecific races of this kingfisher, because a great amount of variation exists as regards the size and shape of the bill, at least in material from East Africa * * * examined.

Sclater [88] writes that this form may range east to the Nile Valley, but Lynes [92] writes that the birds of Darfur are of the typical race.

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[88] Syst. Avium Ethiop., 1924, p. 218.

[89] Nov. Zool., vol. 28, 1921, p. 106.

[90] Journ. f. Ornith., 1925, p. 90.

[91] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 280.

[92] Ibis, 1925, p. 382.

3. *Halcyon chelicuti damarensis.*—South Africa north to Mossamedes and Bulawayo. This race is characterized by larger size than either of the other two (wing 82–88 as against 73–85), and slightly darker coloration. Gyldenstolpe[91] writes that he can not:

> * * * find that these birds (South African) are darker than specimens from further north. As a rule it appears as if South African birds have longer bills, and if the characters pointed out above (wing length and bill) will be considered sufficient for separating a southern form, this ought to be known as *Halcyon chelicuti damarensis* * * *

It is necessary to come back to Grote's form *hylobius* for a more detailed discussion of the geography of size variation in this bird. In his original description he writes that it is intermediate in size between the smaller, light-colored *chelicuti*, which seldom has a wing length of more than 80 millimeters, and the larger, darker-colored *damarensis* which usually has a wing length of not less than 82 millimeters and which varies from 82–90 millimeters. The wing length of *hylobius* is given as ranging from 79–84 millimeters. In color *hylobius* is said to resemble *damarensis*, and Gyldenstolpe[91] has stated that the latter does not differ constantly in this character from *chelicuti.* In other words, the overlapping in size of the three is so extensive as to make it practically impossible to identify any single specimen as *hylobius.* The extent of the overlapping and of individual variation in tropical east Africa led Grant[93] to write that he could see no racial differences between eastern and western or northern and southern specimens. Gyldenstolpe[91] writes that birds from Senegal, Upper White Nile, and Northern Somaliland are rather small, having wings 73–77 millimeters long, while specimens from Kenya Colony, Tanganyika Territory, Uganda, eastern Belgian Congo, and lower Congo have wings 77–85 millimeters in length "* * * and are thus more or less intermediate between birds from Abyssinia, etc., and those from South Africa." I do not know from what part of Ethiopia he saw specimens, but all of the 23 Ethiopian birds examined in the course of the present study, with two exceptions (76.5 millimeters each), fall within the latter limits. If Senegalese birds are uniformly smaller than these, then they should be separated, in which case the name *variegata* Vieillot would be available for them. Inasmuch as *chelicuti* was described from Ethiopia, and since Ethiopian birds do not differ from East African ones, I can see no ground for the support of *hylobius.* Grote writes that *hylobius* is the form of the West African forest region, but this bird does not live in forested country, so there is no ecological reason for its racial differentiation as might seem to be the case from a casual reading of Grote's paper.

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[91] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 280.

[92] Ibis, 1915, p. 267.

I have carefully examined a series of 71 specimens of *chelicuti* and one of *damarensis*. Because of the dispute as to the size criteria of races I append a table of measurements which may serve to show the factual basis on which I reject *hylobius* Grote. Grote writes that if this species had been a palearctic one, it would have long since been split as he advises. But we do not yet know African birds with anything like the intimacy of our knowledge of palearctic species, and can not therefore judge such matters with the same degree of precision.

Locality	Sex	Wing	Tail	Culmen
Ethiopia:				
Dire Daoua	♂	80. 5	44. 0	33. 0
Do	♂	78. 0	42. 5	34. 0
Do	♂	79. 0	41. 0	36. 0
Hawash River	♂	76. 5	39. 5	32. 0
Gato River near Gardula	♂	76. 0	42. 0	32. 0
Do	♂	81. 0	43. 0	32. 0
Do	♂	82. 0	44. 5	33. 0
Do	♂	81. 0	48. 0	30. 5
Do	♂	81. 0	41. 0	31. 0
Bodessa	♂	81. 0	43. 5	35. 0
Do	♂	82. 0	43. 5	37. 0
Do	♂	81. 0	43. 0	32. 0
Maraco		76. 5	42. 0	33. 0
Do	♂	79. 5	42. 0	33. 5
Kenya Colony:				
Changamwe	♂	76. 0	41. 0	34. 5
Thika	♂	82. 5	47. 5	32. 5
South Guaso Nyiro	♂	82. 5	47. 0	33. 0
Do	♂	81. 0	44. 0	33. 5
Naivasha	♂	79. 0	43. 5	31. 0
South Guaso Nyiro	♂	80. 0	46. 0	33. 0
Do	♂	81. 0	45. 5	33. 0
Kisumu	♂	78. 0	45. 0	30. 0
Do	♂	78. 5	45. 0	32. 0
Taveta	♂	78. 0	41. 0	37. 5
Meru River	♂	79. 0	45. 5	31. 0
Embu	♂	79. 0	45. 0	35. 0
Ithanga Hills	♂	83. 0	47. 0	34. 5
Northeast Mount Kenia	♂	79. 0	43. 0	34. 0
Do	♂	77. 0	44. 0	32. 0
Do	♂	79. 0	44. 5	34. 5
Tanganyika Territory, Dar es Salaam	♂	73. 0	41. 5	31. 0
Uganda:				
Nkyanuna	♂	81. 0	47. 0	31. 5
Kigomma	♂	79. 0	42. 0	34. 0
Rhino Camp	♂	80. 0	43. 0	32. 0
Nyouri Jardin	♂	76. 0	41. 5	31. 5
Ethiopia:				
Dire Daoua	♀	78. 0	41. 0	32. 0
Do	♀	77. 0	41. 0	31. 0
Do	♀	80. 0	41. 0	32. 0
Do	♀	79. 0	43. 5	33. 0
Do	♀	78. 0	42. 5	31. 0
Hawash River, Iron Bridge	♀	78. 0	42. 0	30. 0
Do	♀	74. 0	41. 5	30. 5
Do	♀	79. 0	42. 0	31. 5

Locality	Sex	Wing	Tail	Culmen
Ethiopia—Continued.				
Bodessa	♀	80. 5	43. 0	33. 0
Alkusar	♀	80. 0	41. 0	32. 5
Maraco	♀	78. 0	42. 0	33. 5
Do	♀	82. 5	42. 5	33. 0
Kenya Colony:				
Lekiundu River	♀	82. 0	43. 5	33. 5
Do	♀	82. 0	42. 5	35. 0
Thika River	♀	82. 0	46. 0	32. 0
Do	♀	84. 0	44. 5	36. 0
Changamwe	♀	77. 0	44. 5	31. 0
Fort Hall	♀	85. 0	48. 0	34. 5
Sotik district	♀	79. 0	45. 0	39. 0
Do	♀	81. 0	45. 5	34. 0
Naivasha	♀	83. 0	44. 0	33. 0
Meru River	♀	81. 5	49. 0	35. 5
Taveta	♀	80. 0	47. 0	35. 0
Do	♀	81. 0	45. 0	35. 5
Tana River	♀	81. 5	45. 5	35. 0
Kazita River	♀	79. 0	44. 0	35. 0
Northeast Mount Kenia	♀	78. 0	43. 0	34. 5
Do	♀	80. 0	44. 5	33. 5
Do	♀	80. 0	43. 5	35. 0
Sudan, Blue Nile, El Mesherat	♀	76. 5	45. 0	34. 0
Uganda, Rhino Camp	♀	78. 5	44. 5	30. 0
Tanganyika Territory, Uluguru Mountains	♀	76. 0	45. 0	30. 0
Mozambique, Lumbo	♀	74. 0	44. 0	31. 5

Three of the specimens collected by Mearns are molting. Of these three, two are from Dire Daoua, December 5 and 15, while the third is from Lekiundu River, August 6. In all three the evidence of the wing molt upholds the conclusions reached by Laubmann in his studies of the order of the molt of the remiges in this genus, the two centers of origin being the innermost primary and the seventh primary. The molt begins at the first center before it does at the second and progresses more rapidly in the first case, so that the old sixth primary is replaced and the new one fully grown before the new outermost remex has attained full size. Curiously enough, although specimens were taken over a period of nine months, none show any signs of tail molt.

The coloration of the adults varies in intensity on the upper parts; the lightest bird examined has the scapulars and interscapulars grayish olive brown, the darkest chaetura drab. The blue of the lower back, rump, and upper tail coverts ranges from Nile blue and beryl green to Venetian blue, light methyl blue, and Italian blue. The breast varies from practically immaculate white or creamy white to light buffy white finely streaked with narrow earth brown shaft stripes. The stripes are not the stripes of the immature plumage. In the latter plumage the whole pectoral area is heavily streaked and the feathers narrowly tipped with brown, giving it a scalloped appearance. In the southern *damarensis* the streaks and edges are darker than in *chelicuti.*

This kingfisher is widely distributed in the region dealt with in this paper. Von Heuglin found it, usually in pairs, all along the Red Sea coasts and all through Ethiopia except on very high mountains, in Takah, Galobat, and Sennar. He noted that it inhabits open, dry, hilly country, steppes, and thinly wooded regions, and although it was numerous he never saw it near water. Rüppell's observations bear out those of Von Heuglin. Although the latter worker found this bird in Ethiopia, and met with it frequently not only in that country but farther north in Bogosland as well as in the adjacent parts of the Sudan, Blanford did not see it at all, a fact which suggests that it may be locally absent in the Anseba Valley and adjacent parts of Eritrea and Ethiopia. Both Neumann and Erlanger obtained specimens in southern Shoa, and the latter in Somaliland as well. Here again there is a curious disharmony in the results of different collectors. The Italian travelers who collected in Shoa for Salvadori never met with this kingfisher, although Neumann, Erlanger, and Mearns were successful in this regard.

Living as it does far from water, this bird has taken to nesting in holes in trees instead of in river banks. Rüppell was the first to discover this. The breeding season in northeastern Africa is in the months of August and September according to Von Heuglin, but Erlanger [94] found a nest on March 17 near Ginir in Arussia-Gallaland. The nest was in an abandoned woodpecker hole about 10 feet up in a broken tree trunk, and contained five fledged young. Böhm found a nest with young and eggs on March 21, and Erlanger writes the breeding season in Shoa, Gallaland, and Somaliland to be from January to March.

Apparently Mearns collected examples of this kingfisher everywhere he saw the species in Ethiopia, but in Kenya Colony he observed many in places where he did not take the trouble to procure any. These records are: Tana River, August 15–23, 63 seen; Tana River at mouth of Thika River, August 23–26, 14 noted; Thika River. August 26–27, 24 birds; west of Ithanga Hills, August 28, 10; Athi River, August 29 to September, 72 noted.

Family MEROPIDAE

MEROPS NUBICUS NUBICUS Gmelin

Merops nubicus Gmelin, Syst. Nat., vol. 1, pt. 1, p. 464, 1788: Nubia.

Specimens collected:

Three males, one female, and one unsexed, Gidabo River, 3,700 feet, Ethiopia, March 17. 1912.

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[94] Journ. f. Ornith., 1905, p. 448.

One male and one female, Reishat, Lake Rudolf, Kenya Colony, May 25, 1912.

The carmine bee eater inhabits most of Africa south of the Sahara Desert. It has been differentiated into two races, the typical one with the chin and throat deep greenish blue like the top of the head, and the southern *nubicoides* which has the chin and throat rosy carmine like the rest of the underparts. The two forms are so very distinct that they might be considered species instead of races, and as far as I know, no intermediates are known. However, they are more closely related to each other than to any other species of *Merops* and as a trinomial serves in this case to illustrate the degree of affinity there is nothing to be gained in reverting to binomial treatment.

In the course of this study I have examined a series of 36 specimens of *nubicus* and two of *nubicoides* and can not add anything to the ranges of the two as given by Grant[95] or by Sclater.[96] The typical form occurs as far south as the Rufiji River, Tanganyika Territory, in eastern Africa, and apparently no specimens have been recorded from anywhere in the southern part of Tanganyika Territory. The red-throated *nubicoides* has not been reported north of Mozambique, the Zambesi Valley, and Nyasaland.

The size variations are as follows (in millimeters):

Twenty males: Wing 143.5–160 (150); tail, 168–207 (181); culmen 35–43 (41.7). Fifteen females: Wing, 145–150 (148), tail 168–191 (178); culmen, 37–40 (38.5).

The middle tail feathers exceed the others in length by from 65–100 millimeters.

Erlanger[97] has given a detailed account of the plumages of the young and adult of this bee eater. His account is upheld by the material I have seen, but the colors of the figures in his plate, particularly of the adult in fresh plumage (Fig. 1) are not quite correct. The head and throat are darker, more bluish than in his figure, the red of the upper back, wings, and underparts should be deeper, brighter carmine, and the inner secondaries are less pure green, more ashy bluish green than in his plate, about half way between the colors of those feathers in Figures 1 and 2.

This species is widely distributed in the area under consideration in this report but does not occur far from water. It is more gregarious than the other members of its group, and this habit, together with its bright coloration, make it conspicuous and therefore frequently recorded. Rüppell found it in flocks and Von Heuglin estimated that some of the flocks he saw contained thousands of birds. However, it thins out numerically in northern Ethiopia and is scarce (that is, more local, as in localities where it does exist, it occurs in flocks) in adjacent parts of Eritrea. Blanford[98] writes that he saw it but once. "* * * A large number were collected about one spot close to the hot spring of Atzfut on the shores of Annesley Bay. Mr. Jesse also met with it only once and in the same neighborhood." According to Antinori it is only a migrant in Shoa where he obtained specimens from September to January. However, it appears that he was misled by its gregarious habit and assumed the presence of flocks to be a sign of migration. The fact that Mearns procured a specimen at Gidabo River on March 17 indicates the presence of the species throughout the year. It does, however, appear to be much more local during the breeding season than at other times. Both Neumann and Erlanger found it only during November and December, and the latter mentions that he never saw it during the breeding season. The nesting time, according to Von Heuglin, is in the beginning of the summer rains (March and April in Sennar and the White Nile country; June and August in the eastern Sudan).

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[95] Ibis, 1915, p. 300.

[96] Syst. Avium Ethiop., 1924, p. 220.

[97] Journ. f. Ornith., 1905, p. 453, and pl. 9.

AEROPS ALBICOLLIS MAIOR Parrot

Aerops albicollis maior Parrot, Orn. Monatsb., vol. 18, p. 12, 1910: Bagamoyo.

Specimens collected:

Male, Malata, Ethiopia, June 22, 1912.

Female, Chaffa, Ethiopia, June 23, 1912.

Male, Hor, 3° 19′ N., Kenya Colony, June 27, 1912.

Three males, and 2 females, 18 miles southwest of Hor, Kenya Colony, July 1, 1912.

Male, North Rudolf, Womo River, Kenya Colony, May 30, 1912 (C. Frick, collector).

In studying the present species I have examined a series of 16 specimens of typical *albicollis* and 28 of *maior*, making 44 in all. The two races are distinguishable chiefly by the length of the bill, the eastern *maior* having that member longer than in typical, western birds. In his original description Parrot writes that *maior* differs from *albicollis* in having the black pectoral band wider and in having all the dimensions larger (wing 98–108 millimeters). The character of the width of the pectoral band does not hold, and, as may be seen from the following table of the size measurements of adult males, the wing length is not always greater in eastern birds, although it does frequently achieve greater proportions in *maior* than it ever does in *albicollis*.

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[98] Geol. and Zool. Abyss., 1870, p. 321.

Locality	Sex	Wing	Tail	Culmen
Cameroon:				
Sakbayeme	♂	97. 0	159	32. 0
Metet	♂	93. 5	153	32. 0
Sakbayeme	♂	98. 0	144	33. 0
Do	♂	99. 0	190	30. 0
Do	♂	95. 0	189	31. 5
Do	♂	95. 5	150	31. 0
Do	♂	95. 0	176	27. 5
Do	♂	101. 5	------	30. 5
Metet	♂	94. 5	------	30. 5
Liberia, Monrovia	♂	96. 0	174	33. 0
Uganda, Rhino Camp	♂	101. 0	168	32. 5
Kenya Colony:				
Kazita River	♂	98. 0	169	41. 5
Tana River	♂	100. 5	165	40. 0
Do	♂	98. 0	------	35. 0
Do	♂	94. 0	157	36. 5
Do	♂	104. 0	173	39. 5
Do	♂	98. 0	168	39. 0
North Lake Rudolf, Womo River	♂	100. 5	179	35. 0
Hor, 3° 19′ N	♂	100. 0	------	33. 0
18 miles southwest of Hor	♂	98. 5	------	31. 5
Do	♂	99. 5	------	30. 0
Do	♂	103. 5	150	40. 0
Ethiopia, Malata	♂	103. 5	------	32. 5
Tanganyika Territory:				
Dar es Salaam	♂	99. 0	165	35. 0
Kome, Mwanza	♂	97. 0	148	33. 0

Hartert [99] writes that wings of West African birds measure 95–100, those of northeastern Africa 100–108 millimeters. The female collected by Mearns at Chaffa, Ethiopia, has a wing length of 97 millimeters, however. Gyldenstolpe [1] writes that eight birds from Eritrea have wings varying from 96.2–106.2 millimeters in length, so that the Chaffa bird is not the only exception to Hartert's measurements.

The material examined by me is unfortunately either from extreme western parts of west Africa or from east Africa, with very little from intermediate areas. Consequently I can not contribute anything definite to the task of delimiting the ranges of the two forms. As far as the material goes, it upholds the conclusions reached by Sclater.[2] The eastern limits of the typical form are by no means clear. Sclater writes that *albicollis* occurs east to the Uele and Ituri districts of the Belgian Congo, but both Gyldenstolpe [1] and Sassi [3] call birds from the eastern Ituri district simply *Aerops albicollis* and either state or suggest that subspecies are unrecognizable.

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[99] Nov. Zool., vol. 28, 1921, p. 105.

[1] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 270.

[2] Syst. Avium Ethiop., 1924, p. 221.

[3] Ann. K. K. Naturhist. Hofmus. Wien, vol. 26, 1912, p. 372.

This may be taken to indicate that this region may probably be the meeting ground of the two forms and be inhabited by intermediate birds, which are naturally difficult, if not quite impossible, to identify with either race. However, another explanation is also possible, namely, that the long-winged *maior* may migrate to the eastern Congo and there occur together with *albicollis*, but not breed there. After this idea came to me I found that I had been anticipated by Zedlitz,[4] who noted that, although Sassi[3] recorded the series of 37 birds collected by Grauer as containing 26 which had wings more than 98 millimeters in length (98 millimeters being the supposed minimum for *maior*), all the birds were collected from September to February—in other words, in the northern winter when the species was absent from Ethiopia. Zedlitz writes that the migration of this bee eater is not absolutely in a north-south direction, but rather more in an east-west line. In reality it is a combination of both as the bird occurs much farther south in winter than in the breeding season. Lynes[5] notes that in Darfur the typical race is a "common summer visitor or migrant from east to west * * *," but in the very next sentence he writes that in spring he observed small parties flying northward.

It may not be out of place to put on record the fact that the range of the typical race is somewhat more extensive than Sclater's[2] account would indicate. He writes that the bird occurs in West Africa from Senegal to Gaboon, east through Northern Nigeria and the southern Sahara to the Uele and the Ituri districts of the Belgian Congo. However, Henderson obtained it in Angola, as recorded by Hartlaub,[6] Bocage,[7] and Reichenow.[8] The statement of range should accordingly be amended to read "Senegal to Gaboon and Angola, etc. * * *."

The present subspecies occurs from the Anglo-Egyptian Sudan, Ethiopia, Bogosland, Eritrea, and Somaliland south through Kenya Colony and Uganda (west to the West Nile Province, where, however, the birds are somewhat intermediate in nature) to Tanganyika Territory, in which country it is known to occur as far south as the vicinity of Dar es Salaam. It also occurs in southwestern Arabia (Yemen Province). In the southern part of its range (Tanganyika Territory) the bird is known only as a migrant, there being no indications of its breeding there. It is likewise only as a migrant in southern Somaliland and its status in Kenya Colony is probably the same, although not as definitely indicated by the few facts we possess. Not enough is known to plot the migration either geographically or on a fairly exact time (season) scale. Brehm recorded this bee eater as arriving at Khartoum in the beginning of June and departing for the south in late November. On the other hand Neumann found it migrating through Kaffa in March. Zedlitz found that it was absent from January to May in the Eritrean and Danakil coastal belt but was abundant there during the latter half of June.

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[2] Syst. Avium Ethiop., 1924, p. 221.

[3] Ann. K. K. Naturhist. Hofmus. Wien, vol. 26, 1912, p. 372.

[4] Journ. f. Ornith., 1915, p. 32.

[5] Ibis, 1925, p. 375–376.

[6] Syst. Orn. W. Afr., 1857, p. 39.

[7] Ornith. d'Angola, 1877, p. 88.

[8] Vög. Afr., vol. 2, p. 318.

Little is known of the breeding season, except that it is probably in late summer. Antinori states that the nesting time is in September. Farther north it is said to begin earlier. However, Von Heuglin states that the males molt into fresh plumage in September in Sennar and western Ethiopia, a fact which suggests that the nesting season probably begins in late July or early August. Reichenow [9] records this species breeding at Khartoum in October (on the strength of Murie's observations).

An error that should be corrected lest it cause confusion, is the supposed occurrence of this bird in the Ethiopian and Eritrean coastlands during the winter. Reichenow [9] records it from there from December to February on the basis of Blanford's notes. However, Blanford [10] writes that in—

> December, January, and February this bird was not found in the coast region, but with some other species it migrated into the country in the spring, and abounded throughout Samhar in June and July. I saw it as far inland as Rairo in Habab, but it appeared to be restricted to the tropical dry coast region.

The female from Chaffa and three of the birds from 18 miles southwest of Hor are young and have the central rectrices only slightly longer than the others. They also have the feathers of the crown tipped with greenish. According to Reichenow [9] young birds lack the light bluish color just posterior to the black pectoral band. However all these specimens have this color developed to the same extent as do the adults.

The molts of this bird present one feature of interest, namely that they are irregular with respect to migration. That is, some individuals molt in their winter quarters (after migrating) while others molt before leaving their breeding range. Thus, in a small series from Tanganyika Territory (winter quarters), November to January, some birds are in very worn plumage (November) while others (November and January) are in fresh plumage. As already noted in another connection, Von Heuglin found the birds to molt in September in their summer or breeding range.

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[9] Vög. Afrikas, vol. 2, p. 318.

[10] Geol. and Zool. Abyss., 1870, p. 321.

Adults vary very noticeably with regard to the length, shape, and color of the elongated middle rectrices. The actual length is difficult to study because of wear and because different specimens have these feathers in different stages of growth. However, some birds have them considerably narrower than others, even basally. The former have the terminal narrowing more in the form of a gradual tapering, the latter more a matter of sudden, but rounded, indentation of the webs causing a definite and very local difference in width of the vexillæ.

MELITTOPHAGUS PUSILLUS SHARPEI Hartert

Melittophagus sharpei HARTERT, Bull. Brit. Orn. Cl., vol. 10, 1899, p. 27: The Haud, Somaliland.

Specimens collected:

Seven adult males, two adult females, Dire Daoua, Ethiopia, November 28 to December 17, 1911.

Two adult males, two adult females, Sadi Malka, Ethiopia, December 21, 1911 to January 30, 1912.

One adult female, Gardula, Ethiopia, March 27, 1912.

Three adult males, three adult females, two young (?), Gato River near Gardula, Ethiopia, April 9 to May 14, 1912.

Two adult males, one immature male, Sagon River, Ethiopia, June 3–4 1912.

Soft parts: Iris, red; bill, black; feet and claws, purplish brown.

The races of this bee eater have been reviewed three times in the last 20 years. It might therefore seem that little could be gained from another study of the systematics of this species, but such has not proved to be the case. Zedlitz[11] recognized four races—*pusillus*, *ocularis*, *cyanostictus*, and *meridionalis*. Claude Grant[12] considered *ocularis* a synonym of *meridionalis*, and concluded that there were but three valid races. Finally, Sclater[13] after having previously[14] agreed with Grant, recognized four forms with the same names and ranges as in Zedlitz's paper. In 1899 Hartert[15] separated *sharpei*, while under the impression that Cabanis' type of *cyanostictus* came from Natal and was therefore the same as *cyanostictus*. Reichenow[16] showed, however, that Cabanis distinctly stated that this type came from Mombasa. Both Zedlitz and Grant therefore considered *sharpei* as a synonym of *cyanostictus* and gave the range of the latter as eastern Africa from southern Ethiopia and Somaliland to northern Tanganyika Territory. In his description of *sharpei* Hartert called it the "East African" form, which justified Zedlitz and Grant, and later, Sclater, in following the course they took. However, recently Hartert[17] has said that the type of *sharpei* came from the Haud, Somaliland, and found that birds from Somaliland and Shoa differ from those of tropical East Africa in having the blue superciliaries more extensive posteriorly and darker in color. The name *sharpei*, of course applies to the northern birds.

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[11] Journ. f. Ornith., 1910, p. 771.

[12] Ibis, 1915, pp. 294–295.

[13] Syst. Avium Ethiop., 1924, pp. 221–222.

[14] Ibis, 1919, p. 662.

[15] Bull. Brit. Orn. Cl., vol. 10, p. 27.

[16] Orn. Monatsb., 1900, p. 86.

In studying the variations of this species I have examined a series of 122 specimens from West Africa, Sudan, Ethiopia, British Somaliland, Kenya Colony, Uganda, Tanganyika Territory, and South Africa, and find that Hartert is absolutely correct in regard to the validity of *sharpei* and that Zedlitz and Sclater are justified in recognizing *ocularis*. I recognize five races, as follows:

1. *M. p. pusillus.*—West Africa from Senegal, Gambia, Sierra Leone, Gold Coast, and Nigeria to Cameroon, north to the northern border of the upper Guinean savannas, east to Lake Chad and eastern Darfur. Sclater gives the Chad district as the eastern limit but Lynes[18] writes that, "* * * western Kordofan to eastern Darfur should be the boundary between these two races * * * but there is likely to be a fusion of races between Longs. 26° and 29° "* * *."

2. *M. p. ocularis.*—Eritrea, Bogosland, northern Ethiopia and the Nile Valley from Khartoum to the Bahr el Ghazal and northwestern Uganda, west to eastern Darfur, or at least, western Kordofan. Sclater writes the range as, "The Nile Valley * * * *east* to is likely to be a fusion of races between Longs. 26° and 29° * * *." (italics mine), but he obviously meant to say east for west and the opposite.

3. *M. p. sharpei.*—Somaliland, Shoa, central and southern Ethiopia.

4. *M. p. cyanostictus.*—Jubaland, Turkanaland, and northern and central Kenya Colony, south in the eastern part to the Kilimanjaro district, the Usambara Mountains, Tanga, and the Pangani River, Tanganyika Territory. In southern Kenya Colony, northern Tanganyika Territory, and the Kavirondo districts this form intergrades extensively with the next.

5. *M. p. meridionalis.*—Ruwenzori, eastern Ituri district, Belgian Congo, Ruanda, Urundi, Uganda, the Sotik district of Kenya Colony (more or less intermediate between this and the last), northern Tanganyika Territory, to Dar es Salaam, south through East Africa to Zululand, the Transvaal, and Natal, west through the Katanga, Rhodesia, and Bechuanaland, to Angola (north to the mouth of the Congo River), and to Ovampoland and Damaraland.

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[17] Nov. Zool., vol. 31, 1924, pp. 112–113.

[18] Ibis, 1925, p. 376.

The races may be identified as follows: The blue superciliary stripes are extended forward and form a continuous stripe along the forehead only in *cyanostictus* and *sharpei*. In the former the band is lighter blue and does not extend as far back on the dorsal side of the black auriculars as in the latter. In *sharpei* the band is darker, almost purplish or violet blue in some individuals, and extends posteriorly at least to the end of the black auriculars. Caution should be exercised in using the last character as the " make " of the skin may distort the results. Of the other three forms, *pusillus* alone completely lacks the bluish superciliaries, and *ocularis* differs from *meridionalis* in having narrower black bands on the rectrices, these marks being about 10–12 millimeters wide in the former, and 14–16 millimeters wide in the latter race.

The size variations of *sharpei* are as follows:

Males: Wing, 74–82 (77.7); tail, 62–67 (63.6); culmen, 22.5–29 (26.1 millimeters). Females: Wing, 76–80 (78); tail, 62.5–70 (66); culmen, 24–28 (25.9 millimeters). The size differences between races is slight and only an average one at that, the overlapping being practically as extensive as the limits of variation. For example, the wing length in males of *cyanostictus* varies from 76 to 85 with an average of 79.9 millimeters. The other measurements are similarly only slightly different from those of *sharpei*. In *ocularis* the wing length of adult males ranges from 76.5 to 79.5 with an average of 77.3 millimeters.

The immature plumage of *sharpei* is quite like that of *cyanostictus*, but the superciliaries and forehead are darker, more violaceous blue in the former. The adults of both these races vary in the color of the middle rectrices and also of the edges of the secondaries. Six birds of the 20 listed above have these parts distinctly bluish green, the rest have them greenish without any trace of blue. Granvik[19] first noted this for *cyanostictus* and observed that, "* * * this * * * blue tint is a color appearing at about the time of—or somewhat earlier than—the moult." This is borne out by the series examined by me. The bluish color appears to be due to wear and fading, but not entirely to these factors, as some fresh plumaged " green " birds have bluish edges to some of the inner secondaries and a very little bluish tinge on the margins of the middle tail feathers. Of course, it may be that the edges being more exposed than the rest of the feather, the blue would show there first. The " blue," worn-plumaged birds were all taken in March, April, and May.

According to Erlanger[20] the breeding season is in March and April, which observation is in keeping with the worn plumage of the specimens taken during that period. On April 9 at Gato River, Mearns shot a pair of birds, which he entered in his note book as "mated pair killed by same shot." Erlanger says that in May, June, and July, he collected young birds in fresh plumage. The three juvenal specimens obtained by Mearns were procured on May 13, May 14, and June 3 respectively. Blanford[21] found the birds molting in July in the Anseba Valley (subspecies *ocularis*). Lynes[22] writes of *ocularis* that in Darfur the complete molt is in the autumn, so the breeding season probably is in summer, which corresponds fairly well with records of the typical race in Nigeria and Liberia.

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[19] Journ. f. Ornith., Sonderheft, 1923, pp. 108–109.

[20] Idem, 1905, p. 455.

Antinori found this bird commonly distributed throughout Shoa but not ascending to great heights. It is characteristically an inhabitant of the Acacia-Mimosa thornbush country and, not being confined to the vicinity of water, is found throughout most of the territory in its geographic range.

Mearns found this bird in the following localities: Loco, March 13–15, 4 seen; Gidabo River, March 15–17, 10 birds; Abaya Lakes, March 18–26, 75; near Gardula, March 26–29, 4 seen; Gato River, March 29 to May 17, 50; Bodessa and Sagon River, May 19 to June 6, 87; Tertale, June 7–12, 75; El Ade, June 12–14, 20 birds; Mar Mora, June 15, 10 seen; Turturo, June 15–17, 20 seen; Anole, June 17, 40; Wobok, June 18, 40; near Saru, June 19, 25 birds; Yebo, June 20, 20 seen; Karsa Barecha, June 21, 25 birds; Chaffa villages, June 22–25, 38 birds noted.

MELITTOPHAGUS PUSILLUS CYANOSTICTUS (Cabanis)

Merops cyanostictus CABANIS, in Von der Decken's Reisen, vol. 3, 1869, p. 34: Mombasa.

Specimens collected:

One adult male, Lake Stefanie, south, Kenya Colony, May, 1921.

One adult male and one adult female, Nyiro Mountain, Indunumara Mountains, Kenya Colony, July 13, 1912.

Two immature males, Endoto Mountains, south, Kenya Colony, July 22–24, 1912.

One adult male, Guaso Nyiro River, Kenya Colony, August 2, 1912.

One adult male, Lekiundu River, Kenya Colony, August 6, 1912.

One adult male and one adult female, Tana River, camp No. 5, Kenya Colony, August 19, 1912.

One adult female, Tana River at mouth of Thika River, Kenya Colony, August 24, 1912.

The distribution and plumage variations of this race have already been dealt with under *sharpei* and need not be repeated here.

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[21] Geol. and Zool. Abyss., 1870, p. 322.

[22] Ibis, 1925, p. 376.

Grant[23] writes that the juvenal plumage of *cyanostictus* is darker above and below than that of *meridionalis*. He had seen but one of the former. I have seen but one young bird of the latter race and six in corresponding plumage of the former, and, as far as the limited material permits of an opinion, I agree with Grant's statement. However, the specimens of juvenal *cyanostictus* show considerable variation among themselves, and with ampler material the slight apparent difference between the two may disappear. On the other hand, the young of *sharpei* are very slightly darker, possibly more bluish, on the breast than those of *cyanostictus*. In this case I have seen small series of each and feel more confident as to the reality of the difference. In the former the superciliaries (which apparently do not appear until all the other parts of the plumage are fully developed) are darker and more purplish than in the latter.

In the southern part of its range this race intergrades with *meridionalis* to such an extent that it is often difficult to identify specimens to either. It is all the more unfortunate, therefore, that the type locality should be as far south as Mombasa. Oberholser,[24] in reporting on Abbott's Kilimanjaro collection, notes that birds from Taveta are more or less intermediate between *cyanostictus* and *meridionalis*, but a specimen from there in the Museum of Comparative Zoölogy (H. Friedmann collection) is typical *cyanostictus*. The ranges of the two forms are, however, complementary, and the area of overlapping relatively narrow.

I find the following entries of this species in Mearns' notes: Lake Rudolf, southeast, July 11–12, 4 birds noted; Indunumara Mountains, July 12–18, 50; plains at base and south of the Endoto Mountains, July 19–24, 70; Er-re-re, July 25, 20 seen; Le-se-dun, July 26, 10 noted; Malele and country to the south for 45 miles, July 27–30, 50 birds; Northern Guaso Nyiro River, July 31 to August 3, 30 seen; Lekiundu River, August 4–8, 30 noted; Tharaka district, August 12–13, 24 birds; Tana River, August 19–26, 120 birds noted.

MELITTOPHAGUS LAFRESNAYII LAFRESNAYII (Guérin)

Merops lafresnayii GUÉRIN, Rev. Zool., 1843, p. 322: Ethiopia.

Specimens collected:

Male adult, Dire Daoua, Ethiopia, December 10, 1911 (F. von Zülow collection).

Male adult, Ourso, Ethiopia, September 14, 1911 (A. Ouellard collection).

Male adult, Hawash River, Ethiopia, February 12, 1912.

Male adult, Gidabo River, Ethiopia, March 15, 1912.

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[23] Ibis, 1915, p. 295.

[24] Proc. U. S. Nat. Mus., vol. 28, 1905, pp. 852–853.

Three male adults, Gato River near Gardula, Ethiopia, March 27 to April 13, 1912.

Male adult, Bodessa, Ethiopia, May 26, 1912.

Male adult, Gendo, Kullo, 4,200 feet (1,260 meters), Ethiopia, June 5, 1905 (P. Zaphiro collection).

Male adult, Lake Bakate, Gamu, 2,000 feet (600 meters), Ethiopia, September 3, 1905 (P. Zaphiro collection).

The material available for study (16 specimens of *lafresnayii*, including the type, and 14 specimens of *oreobates*) is not sufficient to enable me to add anything to the known distribution and systematics of this bee eater. The two races are well marked, the typical form having the pectoral band deep blue, while in *oreobates* it is practically black. The ranges of the two are as follows:

1. *M. l. lafresnayii.*—Eritrea, Bogosland, and all of Ethiopia south to the southern Shoan Lake district and to Gallaland. Hilgert[25] lists as *lafresnayii* a young male from Somaliland, but Zedlitz[26] writes that it really is *Melittophagus pusillus cyanostictus* (which, of course, is now *sharpei*).
2. *M. l. oreobates.*—Uganda, Kenya Colony, and northern Tanganyika Territory. In the west it occurs from Ruwenzori, Ruanda, the Kivu Volcanoes, and the Ruzizi Valley south to the highlands west of Lake Tanganyika. In eastern Uganda and Kenya Colony, it is known from as far north as the Turkwell country, Mount Elgon, Kisumu, Marakwet, the Northern Guaso Nyiro, Nairobi, and Kyambu, while in Tanganyika Territory it has been taken as far south as Morogoro and the Kilimanjaro and Usambara Mountains districts. It is essentially a highland bird and its range is consequently rather discontinuous.

Granvik[27] writes that in *oreobates* there are two color phases, a green one, and a bluish one. The specimens examined by me bear this out and show neither sex nor geography to be correlated with this dimorphism. It seems, however, to be a matter of age, birds in first postjuvenal plumage being more bluish, older ones greener. This age difference is not exhibited by the series of typical *lafresnayii*, however, and appears to be restricted to *oreobates*. In this connection it should be noted that Erlanger[28] represents the central rectrices as blue in adults and green in young birds, exactly the opposite of what I find. Erlanger[29] has described in detail the plumages of this bee eater, but unfortunately considers *lafresnayii* and *oreobates* as conspecific with *variegatus*, which they are not.

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[25] Kat. Coll. Erlanger, p. 314.

[26] Journ. f. Ornith., 1915, p. 31.

[27] Idem. 1923, Sonderheft, pp. 107–108.

[28] Idem, 1905, pl. 10, figs *d* and *e*.

[29] Idem, pp. 456-457.

The type specimen of *lafresnayii* is fully adult but in worn plumage, the light tips of the rectrices being almost completely abraded. It has more bluish on the upper parts than any other specimen examined.

According to Van Someren[30] the two races intergrade in the Turkwell country.

The typical form averages slightly smaller than *oreobates*. Thirteen adult males of the former have the following measurements: Wing, 90–100.5 (96.6); tail, 79–87.5 (82.7); culmen, 30–35.5 (32.3 millimeters); while six males of *oreobates* measure: Wing, 100–102 (101); tail, 88–92 (89.4); culmen 32–35 (33.4 millimeters).

In Ethiopia the typical form is said to be migratory, appearing in March.[31] Blanford[32] writes that it is a "* * * common bird in the passes from 3,000 feet upwards, and often seen on the highlands, especially after March." It is absent in the Anseba Valley, according to the same observer. Neumann[33] found that this is the commonest species of its genus in the mountains of southern Ethiopia, and lives in regions between 2,000 and 2,500 meters above the sea. Erlanger[34] records that the breeding season in Ethiopia is in March and April. On May 6 at Gato River, Mearns found a nest of this bee eater. "The nest cavity was six inches in diameter, at the end of a tunnel two and a half feet in a bluff bank, near the bottom. It contained a saucerful of wings of beetles and other insects. An old egg, apparently originally plain white, nearly equally rounded at both ends, had been punctured and its contents removed by insects. Measurements 24 by 19.5 millimeters. An old bird flew out when the tunnel had been dug out to within a foot of the nest cavity."

MELITTOPHAGUS REVOILII (Oustalet)

Merops revoilii Oustalet, Miss. Révoil Comalis, Ois., p. 5, pl. 1, 1882: Somaliland.

Specimens collected:

Male and female, Hor, latitude 3° 19′ N., Kenya Colony, June 28–30, 1912.

Male, 25 miles southeast of Lake Rudolf, Kenya Colony, July 12, 1912.

Two males, one unsexed, Indunumara Mountains, Kenya Colony, July 14–16, 1912.

Male, Endoto Mountains, Kenya Colony, July 20, 1912.

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[30] Nov. Zool., vol. 29, 1922, p. 79.

[31] See Rüppell, Syst. Uebers. Vög. N. O. Afrikas, 1845, p. 24.

[32] Geol. and Zool. Abys., 1870, p. 322.

[33] Journ. f. Ornith., 1905, p. 191.

[34] Idem, 1905, p. 457.

This very distinct bee eater is of interest because of its restricted range and the absence of any representative forms elsewhere. It is known to occur only in Somaliland and adjacent parts of Ethiopia and northern Kenya Colony. The northern limits of its range are Gobeyla, Harrar, the Goolis Mountains, the Haud plateau, and the upper Webi Shebelli; the southernmost points at which it has been found are the Northern Guaso Nyiro in the interior, and the Bardera region nearer the coast. Before the present series was collected, the species was known from the following localities in Kenya Colony: Northern Guaso Nyiro, Thera, and below Chanler Falls. The birds listed above extend the known range westwards to the Lake Rudolf district and indicate that, like so many Somaliland forms, this bird occurs east and south of the Abyssinian highlands extending quite far to the west in the southern part of its range, but not occurring in the intervening mountainous country. Zedlitz[35] records it from Gallaland in the area between Harrar and the Haud plateau of Somaliland but not from west of Harrar.

Inasmuch as this species is relatively uncommon in collections, the following measurements of the series examined are appended for the use of future workers.

Locality	Sex	Wing	Tail	Culmen
Kenya Colony:				
Northern Guaso Nyiro	♂	77. 0	68. 0	30. 5
Do	♂	76. 5	68. 0	31. 5
Endoto Mountains	♂	77. 0	73. 0	31. 0
Indunumara Mountains	♂	74. 0	68. 0	31. 5
Do	♂	76. 5	71. 0	30. 5
Southeast Lake Rudolf	♂	76. 0	72. 0	32. 0
Hor	♂	78. 5	71. 0	-------
Do	♀	79. 5	72. 0	32. 5
Indunumara Mountains	♀	79. 0	72. 0	31. 5
British Somaliland:				
Hullier	♂	70. 0	63. 0	29. 0
Do	♂	76. 5	70. 0	33. 0
Haud	♀	73. 5	66. 5	29. 0

In coloration the series varies but slightly, the amount of tawny on the hind neck being the most noticeably variable, and this appears to be largely a matter of wear, more of the tawny color being exposed as the distal, greenish barbules of the feathers wear off.

Van Someren[36] writes of his two specimens from the Northern Guaso Nyiro that insufficient material prevents him, "* * * from ascertaining whether these are the same as typical birds, but they probably are." Kenya birds are not in any way separable from specimens from Somaliland. It is true that the measurements average very slightly larger in the northern part of the range, but the difference is so slight, the overlapping so extensive, and the total bulk of material available for study so meagre that it would be wholly unjustifiable to split the species into two subspecies. The measurements of the type specimen, as given by Oustalet[37] are larger than of any specimen I have seen or than any reported by Erlanger or Zedlitz. The type measurements are: Wing 80, tail 78, and culmen 29 millimeters. The last probably refers to the exposed culmen, not the total length, as the other figures indicate a large specimen. The colored figure (pl. i) in Oustalet's paper is not very accurate. The rufous tawny of the underparts extends too far up the breast (in fact even the chin is represented as tawny); the same color is far more extensive and noticeable on the back in the figure than in any bird examined, the superciliaries are represented as being wider, more prominent, and bluer than they actually are, and the middle rectrix is figured as having a brilliant blue median portion laterally bordered with green, while in no specimen is this true. The rectrices vary somewhat in their relative blueness and greenness, but never approach the condition shown in the plate. The same is true for the alula and outer secondaries, which are far too blue in the figure.

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[35] Journ. f. Ornith., 1915, p. 30.

[36] Nov. Zool., vol. 29, 1922, p. 79.

The female taken at Hor on June 28 and the male from Endoto Mountains, July 20, were molting the tail feathers when collected. The material is too slight to enable me to work out the order of the molt, but it seems to be irregular—which means that it is worth studying as all irregularities turn out, on proper investigation, to be modified regularities, which often suggest clues as to the factors involved in regulating ecdysis.

This bee eater appears to be quite common in most of its range. Lönnberg[38] found it to be rather common in the thornbush country north of the Guaso Nyiro, but never saw it in flocks, single birds being the rule. Likewise, Erlanger[39] recorded it as very common in the steppes and thorn veldt of southern Somaliland. Considering its high numerical status within its distributional area, the limitations of that area appear all the more interesting. Its southern limit is abrupt; there is no gradual diminution in numbers resulting finally in complete absence of the species as one goes southward from Ethiopia to the Guaso Nyiro. Lönnberg[38] definitely states that as soon as he had passed over to the northern side of the Guaso Nyiro he met with this little bee eater. Similarly, in the northern part of its range, Elliot[40] writes that in Somaliland it was not met with before reaching the plateau south of the Goolis range.

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[37] Miss. Révoil Çomalis, Ois., p. 5, 1882.

[38] Kungl. Sv. Vet. Akad. Handlgr., vol. 47, 1911, p. 74.

[39] Journ. f. Ornith., 1905, p. 455.

[40] Field Colum. Mus. publ. 17, Ornith. series, vol. 1, No. 2, 1897, p. 55.

Erlanger[39] found that his birds, collected during June, were not yet in breeding condition, and he thereby assumed that the breeding season probably was in late summer. Zedlitz writes that the nesting time is in the middle and later parts of summer, but his evidence is merely the statement made by Erlanger as to the condition of the gonads of June birds. Zedlitz suggests that the species may be migratory and breed only in eastern Gallaland and western Somaliland, and shows that all records from Kenya Colony and coastal Somaliland are in the dry season (January, February, and March). However, the present series taken in June and July successfully refutes this hypothesis, at least as far as Kenya Colony is concerned.

Family CORACIIDAE

CORACIAS ABYSSINICUS Hermann

Coracias abyssinica Hermann, Tabula Affin. Anim., p. 197, 1783: Ethiopia (from Buffon, Oiseaux, vol. 3, p. 143, and Daubenton, pl. 626).

Specimens collected:

Male and female, Bilan, Ethiopia, December 19, 1911.
Male and female, Sadi Malka, Ethiopia, February 3, 1912.
Female, Hawash River, Ethiopia, February 10, 1912.

Besides these five birds I have seen three from the Blue Nile and one from Gallabat, Ethiopia. The Sudanese (Blue Nile) specimens are somewhat smaller and fit the requirements of *C. abyssinicus minor*, the so-called western race of this roller. The name *minor* was applied to birds from Senegal by Neumann[41] to replace the name *senegalensis* of Reichenow (not Gmelin). Reichenow separated the western birds on the basis of their having the top of the head and the hind neck tinged with greenish; the blue of the cheeks and throat paler and greener; and the general size somewhat smaller than eastern ones. When renaming the bird Neumann commented to the effect that the color differences were nonexistent, and that the size alone was the distinguishing character of *minor*. Reichenow also separated the birds of southwestern Arabia under the name *arabicus*, on the basis of their having the back, neck, and top of the head light blue more or less mixed with brown. Neither of these races appears to be recognizable. Sclater[42] writes that *arabicus* appears to be indistinguishable from typical *abyssinicus*. Inasmuch as I have seen no Arabian material I follow Sclater in this matter. With regard to *minor*, however, I am able to form my own opinion. Through the courtesy of the Cleveland Museum I have had the opportunity of examining seven males and three females from Senegal, now in that museum. I can find no constant difference of any importance between them and Abyssinian examples. Other workers have found similar difficulties. Sclater and Praed[43] overlooked Neumann's notes and naturally found color characters to be of little value. Lynes[44] writes that his birds from Darfur agree with others from Ethiopia and also with a good many from Senegal (*minor*). Hartert[45] admits that size varies greatly without respect to geography and Lynes, although using a trinomial for his birds, finds that the dimensions of the eastern birds seem to have been magnified by previous students, "* * * for in the British Museum series of 19 specimens from North and South Abyssinia anything exceeding 165 millimeters is an exceptional wing measurement." More recently Bates[46] measured a series from Senegal, Gambia, the Gold Coast, Northern Nigeria, Darfur, Sudan, and Ethiopia, and found little ground for the subspecific separation of the western birds on account of their hypothetically smaller size. Specimens from all these countries showed both extremes of wing lengths, 150 to 170 millimeters. "But a few Abyssinian ones are a little larger, with wings 170 millimeters or over, and Neumann found West African ones to be smaller than Abyssinian ones. It looks as if there must be a larger race in Abyssinia—perhaps in a part only of Abyssinia." He concludes that the birds of the Egyptian Sudan to Senegal must be all called *minor*. Inasmuch as both Sclater and Lynes called birds from as far west as Darfur *abyssinicus*, and inasmuch as this difference of opinion is strengthened by the nongeographic variability of the birds, I have no hesitation in consigning *minor* to the synonymy of *abyssinicus*, a species, which though variable, has produced no valid races.

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[39] Journ. f. Ornith., 1905, p. 455.

[41] Idem, 1917, pt. 2, p. 201.

[42] Syst. Avium Ethiop., 1924, p. 206

The wing measurements of the birds examined are as follows:

Males: Ethiopia, 158, 165.5, 167; Sudan (Blue Nile), 150, 157.5; Senegal, 152–163 millimeters. Female: Ethiopia 159, 159.5, 160; Sudan (Blue Nile), 150; Senegal, 151–156 millimeters.

This species connects the European *garrulus* with the African *spatulatus* and *caudatus* group being, in fact, nothing but a *garrulus* with elongated outer rectrices.

The range as given by Sclater[42] should be extended to include Eritrea and Bogosland. North of Ethiopia proper Blanford[47] found this roller to be not uncommon locally on the highlands, "* * * but by no means generally distributed." He saw it occasionally between Dolo and Antalo, more abundantly about Lake Ashangi (8,000 feet) "and in some of the vallies farther south * * *." He found it very common in the subtropical region of the Anseba and the Lebka and saw a few at Samhar on the coast. Erlanger[48] met with it only in Shoa proper, west of the Hawash Valley. Incidentally, he suggests that this bird may be a race of *caudatus* in which he is wrong, as *lorti*, a race of that species, occurs together with *abyssinicus*. He also calls the present species *abyssinus* instead of *abyssinicus* in which he is likewise wrong. Zedlitz[49] writes that his experience was somewhat different from that of Erlanger. He found *Coracias abyssinicus* very common in southern Ethiopia (where Erlanger saw it but once) everywhere except in the coastal area where it was not noted.

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[42] Syst. Avium Ethiop., 1924, p. 206.
[43] Ibis, 1919, p. 672.
[44] Idem, 1925, p. 385.
[45] Nov. Zool., vol. 28, 1921, p. 104.
[46] Ibis, 1927, p. 25.
[47] Geol. and Zool. Abyss., 1870, p. 319.

The altitudinal range of this bird extends from sea level to over 8,500 feet (2,550 meters).

According to Von Heuglin it breeds in the latter part of the rainy season. Brehm and Vierthaler found it nesting in holes in trees.

CORACIAS CAUDATUS LORTI Shelley

Coracias lorti SHELLEY, Ibis, 1885, p. 399: Somaliland (plateau south of Berbera).

Specimens collected:

Two male adults, near Gardula, Ethiopia, March 24–29, 1912.

Two female adults, Black Lake Abaya, south, Ethiopia, March 25–26, 1912.

Eight male adults, five female adults, and two females, young, Gato River near Gardula, Ethiopia, March 31 to April 24, 1912.

One male adult, Mar Mora, Ethiopia, June 14, 1912.

One male adult, Turturo, Ethiopia, June 15, 1912.

One male adult, Dire Daoua, Ethiopia (Cepharino collection), no date.

Four male adults, Ourso, Ethiopia, September 17 to October 27, 1911 (Ouellard collection).

Soft parts: Iris, grayish brown; bill, all black; feet, olive; claws, black.

Besides the birds listed above I have examined 12 others, making 38 in all. The series shows great variation in color, some features of which are of sufficient importance to merit discussion. The first of these has to do with the status of Madarász's species, *Coracias kovácsi*,[50] a form which has been apparently overlooked by Grant, Zedlitz, Sclater, and other recent workers. This bird is said to be similar to *lorti* but to differ in having the whole breast blue instead of green and with lilac shaft stripes on the feathers. Madarász had a series of 20 specimens, all of which agreed with the type. The fact that *kovácsi* is based on a considerable series rather than on a single specimen prevents it from being casually considered as an aberrant *lorti*. However, the four adult males from Ourso collected by Ouellard[51] are *lorti* and not *kovácsi*. Furthermore, of the entire series of 38 birds, only 1, a male from the Gato River (U.S.N.M. 243721), agrees with the description of that form. Also, it should be remembered that rollers vary greatly in shade of color, some being greener, others bluer. To take the two extremes, we have a bird (U.S.N.M. 243719) from Black Lake Abaya, in which the breast is asphodel green slightly washed with light blue, and another (U.S.N.M. 217998) from near Gardula, in which the breast is practically the same color as the abdomen, which, in both birds, is blue. The single specimen agreeing with the characters of *kovácsi* has the top of the head and the hind nape darker blue, less greenish than most of the others in the series, but is matched by some, which, on the underparts, are certainly like *lorti*. It should be mentioned that the blue colors look blue only when the bird is held between the light and the eye, and become greenish if the eye is placed between the light and the bird.

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[48] Journ. f. Ornith., 1905, p. 459.

[49] Idem, 1910, p. 759.

[50] Bull. Brit. Orn. Cl., vol. 29, 1911, p. 13: Ourso, S. Abyssinia.

If *C. kovácsi* should prove to be distinct, the specimen referred to would have to be considered as of that species, which would extend its range from Ourso to the Gato River near Gardula.

The two immature birds differ from the adults in the following respects: The back is darker, duller, more earth brown, less rufous brown; the top of the head and nape like the back but more grayish and washed with greenish; throat and cheeks dull, pale purplish rufous brown instead of purplish violet, becoming more rufescent laterally, breast dusky earth brown washed with bluish green; abdomen as in adults but paler; tail as in adults but the outermost rectrices not elongated; wings as in adults, but the outer webs of the two outermost primaries deep ultramarine blue, not deep violet. This plumage is followed by an immature plumage in which the adult coloration is attained but the juvenal wings are retained. Immature (second year) birds may be told from adults by the lighter outer webs of the outermost primaries and by the fact that usually (but not always) the throat is more rufescent in immature birds, more deeply purplish in adults.

There can be no doubt as to the juvenal nature of the first plumage described, as the two birds have all the remiges growing in simultaneously, all still basally inclosed in sheaths, a condition possible only with the advent of the first pennaceous feathering.

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[51] See p. 373.

Reichenow [52] records a bird from Osi as a hybrid between *caudatus* and *lorti.* However, he considers the former to occur north to Shoa (Sekwala and Lake Zwai), but Neumann [53] writes that the specimens from these localities are really *lorti* and that the so-called hybrid is merely an intergrade between the two races. It is said by Reichenow to be like *lorti* with the breast bluish on the sides as in *lorti* but violaceous in the center as in *caudatus.* Four of the birds from the Gato River (two males and two females) have the breast blue with a large median posterior purplish spot, so that it seems that in the southern half of its range *lorti* frequently exhibits tendencies toward *caudatus* coloration. In two other specimens the purplish breast spot is continuous with the same color on the throat, forming a fairly broad median purple stripe.

Neumann [53] writes that two females from Lake Zwai and Barssa River, Maleland have a few lilac feathers between the blue ones on the breast, and can not therefore be considered typical *lorti.*

Erlanger [54] writes that with increasing age of the birds the color of the back and interscapulars becomes purer reddish brown, while in younger birds it has an olive-green sheen, and that likewise the throat is green at first (young birds) and is bluer in older examples.

Van Someren [55] notes that the rump varies from deep to pale blue in birds from the same locality. The present series corroborates this, but it would be more accurate to say the variation is from deep violet to light blue or ultramarine blue. The size variations are as follows:

Adult males (23): Wing 158–171 (average 163.3), tail 151–209 (172.5), middle tail feather 108–126 (117.5), and culmen 31–35.5 (33.5 millimeters).

Adult females (13): Wing 156–167 (average 161.6), tail 143–177 (162.6), middle tail feather 107–121 (115.7), and culmen 32–37 (34 millimeters).

Erlanger [54] writes that *lorti* and *abyssinicus* have complementary ranges, but this has since been shown to be wrong. However, their ranges are not wholly coincident by any means; thus, Lort Lovat [56] writes that *lorti* was "* * * never met with in Abyssinia where its place is taken by *Coracias abyssinicus.*" The fact that the ranges of the two do overlap in parts of Ethiopia, together with the lack of intergradation in the overlapping area, precludes the possibility of treating the two as races of one species.

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[52] Vög. Afr., vol. 2, p. 224.

[53] Journ. f. Ornith., 1905, p. 184.

[54] Idem, pp. 458–459.

[55] Nov. Zool., vol. 29, 1922, p. 73.

[56] Ibis, 1900, pp. 317–318.

In its general habits this bird appears to be similar to the typical race. Lönnberg[57] writes that he met this bird as far south as the Acacia steppes of the Lekiundu River, and that it was one of the birds typical of that type of country.

CORACIAS CAUDATUS CAUDATUS Linnaeus

Coracias caudatus LINNAEUS, Syst. Nat., ed. 12, vol. 1, p. 160, 1766: Angola.

Specimens collected:

Male and female, Tharaka district, 2,000 feet (600 meters), Kenya Colony, August 13–14.

Male, Thika River, 20 miles above mouth, Kenya Colony, August 27, 1912.

Female, Thika River, Bowlder Hill, Kenya Colony, August 28, 1912.

Neumann's East African race *Coracias caudatus suahelicus*[58] is not valid. Its characters were supposed to be darker rump, upper tail coverts and lesser upper wing coverts than in typical Angolan and South African birds. However, as shown by Grant[59] and by a series examined by me, none of these characters hold true. Of the present four specimens only one, the male from Tharaka district, has a dark violaceous rump, the other three having this part ultramarine blue. This variation occurs in a series of 11 other birds from East Africa and in 3 from South Africa as well.

As already mentioned under *C. abyssinicus*, Erlanger's suggestion that that bird may be a race of *caudatus* is not to be followed as *abyssinicus* occurs in the same areas as *caudatus* (or, at least, the northern form of the latter, *lorti*).

Sclater[60] and most other students of African birds consider this species as composed of but two races—the typical one inhabiting South Africa (except the Cape Province) north to Angola, Rhodesia, the Belgian Congo (south and east of the forest area), Mozambique, Nyasaland, Tanganyika Territory, southern Uganda, and Kenya Colony (north to Mount Elgon, Eldoret, Kitale, Mau, Nairobi, Meru, Fort Hall, Embu, and Lamu); and the northern form *lorti* of Somaliland, west to the Abyssinian lakes district, south through Jubaland to central Kenya Colony (northeast of Mount Kenia) and along the coastal plain to southern Kenya (Mombasa, Simba, and Tsavo). The latter form differs from the typical subspecies in that reddish-lilac color is restricted to the throat in *lorti* and extends over the entire breast in *caudatus*. Van Someren[61] draws attention to the fact that *lorti* is—

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[57] Kungl. Sv. Vet. Akad. Handlgr., 1911, vol. 47, no. 5, p. 69.

[58] Described Journ. f. Ornith., 1907, p. 593: Usagara, Tanganyika Territory.

[59] Ibis, 1915, p. 262.

[60] Syst. Avium Ethiop., 1924, p. 207.

> * * * found in localities where *C. c. caudatus* occurs, and this not at a period of migration, in January, March, April, June, and August. The question to be settled is, Are these birds stragglers from Somaliland or are they resident, and should they not be reckoned a species? It seems somewhat doubtful that the southern examples of *lorti* are really of that form, and not intergrades between it and *caudatus* or even, possibly, immature *caudatus*. Many intermediate looking birds are known, but not a few of them appear subadult. The two forms are clearly conspecific.

This handsome roller is a common bird throughout its range. Sclater[60] does not definitely include the Belgian Congo in its range, but the Museum of Comparative Zoölogy has a specimen from Luvungi, and it has been collected in the Ruzizi Valley by Pauwels and near Lake Kivu by Kandt, etc. It is common in the savannas from Lake Tanganyika to the Katanga and the Kasai.

Nine males have the following measurements: Wing, 160–173; tail, 171–201; and culmen, 33.5–35 millimeters.

Nines females present the following data: Wing 156–169, tail 171–190, and culmen, 33–36.5 millimeters.

CORACIAS NAEVIUS NAEVIUS Daudin

Coracias naevia Daudin, Traité, vol. 2, 1800, p. 258: Senegal.

Specimens collected:

One unsexed, Dire Daoua, Ethiopia, October 19, 1911.

One male, Gada Bourca, Ethiopia, December 24, 1911.

One male and one female, Hawash River, Ethiopia, February 12, 1912.

One female, Serri, Ethiopia, February 13, 1912.

One unsexed, Ethiopia, March 2, 1912.

One male, near Gardula, Ethiopia, March 29, 1912.

One male and three females, Gato River near Gardula, Ethiopia, March 31 to April 16, 1912.

One male and one female, Bodessa, Ethiopia, May 21–27, 1912.

One female, Tertale, Ethiopia, June 7, 1912.

One male, Turturo, Ethiopia, June 15, 1912.

Besides the 15 birds listed above, 11 others of the typical form and 1 one of the southern race *mosambicus* have been examined. The so-called East African race *sharpei* is not distinct from *naevius*. This leaves but the two forms which are distributed as follows:

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[60] Syst. Avium Ethiop., 1924, p. 207.

[61] Nov. Zool., vol. 29, 1922, p. 73.

1. *C. n. naevius.*—Senegal, Gambia, Gold Coast east through the Sudan to Ethiopia, Eritrea, and Somaliland, south to the northern side of the West African forest belt, northern Uganda, and across Kenya Colony to the central part of Tanganyika Territory.

2. *C. n. mosambicus.*—Angola and Northern Rhodesia south to Bechuanaland, the Transvaal and Natal, omitting the southwestern part of the Union of South Africa (Cape Province north to the Orange River).

The series exhibits considerable variation in color and size. Perhaps the most noticeable character is the width of the white shaft stripes on the feathers of the under parts. In the extreme individuals the difference is very great, the width of these stripes ranging from less than one millimeter on the one hand to over three millimeters on the other. The birds with the narrowest shaft stripes appear to be darker, more rufous violet below than those with the widest white streaks, and while this is partly an optical effect caused by the relative abundance of white in the latter birds, it is not wholly so. The upper parts also vary in color, the back being greener in some, browner in others. All the birds collected by the Frick expedition have dark rufous heads, and Van Someren[62] finds that freshly plumaged examples from Kenya Colony have the heads rufous, without any of the greenish tips to the feathers of the crown found in fresh Senegalese specimens. It appears that the question in his mind (although not expressed in writing) was the validity of Shelley's form *levaillanti*, described on the basis of having the crown more rufous than in typical birds. However, he says that he compared his specimens with a large series from Senegal and found no constant difference. Furthermore, a male from Mwanza, Tanganyika Territory (Loveridge collection) has the crown mixed greenish and rufous brown in about equal proportions. At first sight this specimen might be thought of as intermediate between the typical, rufous-brown crowned form and the southern, green crowned *mosambicus*, but another specimen from the same locality is typical *naevius* in this respect. The white on the nape and hind end of the occiput varies greatly in amount, and in some birds the white feathers are very pale bluish terminally.

The size variations are as follows: Male: Wing 168.5–195, tail 138–152, and culmen 39–42 millimeters. Female: Wing 179–188, tail 133–147, and culmen 39–42 millimeters.

The bird collected at Dire Daoua on October 19 is molting the remiges and has new inner primaries and outer secondaries. However, the outermost primary is also new and about two- thirds grown although the next four are still of the previous plumage.

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[62] Nov. Zool., vol. 29, 1922, p. 73.

This roller is widely distributed in the region covered by the present collection, but is absent in the highlands. Heuglin found it only around forested districts, Blanford noted that it was rather rare in the high country where he saw it but twice, but that it abounded in the subtropical Anseba Valley. Erlanger met with it commonly between Zeila and Jeldessa, also between Harrar and Ginir, in the deeply dissected Arussi-Gallaland district, and in southern Somaliland, a distribution which definitely indicates that Von Heuglin's experience was limited in scope. Heuglin and others found that this species nested in holes in trees, while Erlanger discovered it to nest in holes in sand and earth banks of streams that partially or completely dry up during the dry season. Further evidence as to the ecological adaptiveness of this roller is afforded by Zedlitz who found it around the northern part of the eastern escarpment that separates the Tigre district of Ethiopia from the coastal plains of Danakil. He writes[63] that in that region it is in no sense a forest bird as it seems to be elsewhere, but lives in the baobabs and, on the slopes, in wild fig trees, in country such as *Astur tachiro unduliventer* and *Ptilopachus fuscus minor* are wont to inhabit.

One of these birds (adult male collected near Gardula, March 29) was seen to pursue and fight a large vulture which it apparently made very uncomfortable. It uttered a loud cry as it fought the vulture.

Although no mention is made of the food habits of this species, Mearns noted that one of the females collected was sitting beside a hive of bees in a flat-topped mimosa tree. Inasmuch as the birds of this group are known to be insectivorous the implication is obvious.

Mearns saw several of these rollers between Sadi Malka and Gada Bourca, but did not find them in numbers until he came to the Shoan lake region. The records from the latter region are: Gato River, March 29 to May 17, 100 birds seen; Bodessa and Sagon River, May 18 to June 6, 35 noted; Tertale, June 7–12, 25 seen; El Ade, June 12–14, 22 birds; Mar Mora, June 15, 20; Turturo, June 15–17, 30; Anole, June 17, 4 seen; Wobok, June 18, 20 noted; near Saru, June 19, 20 birds; Yebo, June 20, 20 seen; Karsa Barecha, June 21, 50; Malata, June 22, 10 seen; Chaffa villages, June 23–24, 6 birds noted.

EURYSTOMUS AFER AETHIOPICUS Neumann

Eurystomus afer aethiopicus NEUMANN, Journ. f. Ornith., 1905, p. 184: Schekho on the Upper Gelo River.

Specimens collected:

Male and female, Aletta, Ethiopia, March 9–11, 1912.

Male, Loco, Ethiopia, March 13, 1912.

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[63] Journ. f. Ornith., 1910, p. 760.

The subspecific study of the present species is rendered difficult by three factors: The nongeographic variability of the birds; the apparently great amount of local shifting and wandering of individuals, resulting in the occurrence of two forms in the same place at times; and the lack of sufficient material. Add to these the unusually confusing and contradictory statements in the literature of this roller and the task becomes almost hopeless. In the present study I have examined a series of the 22 birds of the following forms: *afer* 6 (Cameroon and Belgian Congo); *aethiopicus* 3 (Ethiopia); *praedi* 2 (Ethiopia); *rufobuccalis* 2 (Uganda); *suahelicus* 9 (Kenya Colony and Tanganyika Territory). The Angolan form *pulcherrimus* I have not seen. However, the races about which the greatest difference of opinion prevails are those of northeastern Africa and are the ones which are of immediate concern in the present study. They are *afer*, *aethiopicus*, *praedi*, and *suahelicus*.

Neumann[64] was the first to review the forms of this bird and at the time included the Madagascan *glaucurus* as a race of *afer*. Besides *glaucurus* he recognizes all those listed by Sclater[65] except *praedi* (which was not described until 1921), three of the five being new at that point (*aethiopicus*, *suahelicus*, and *pulcherrimus*). Sclater and Praed[66] agree with Neumann's results, but do not consider *glaucurus* as a form of *afer*. The third, and most recent review is that by Bannerman[67] whose conclusions are accepted by Sclater,[62] and, for want of sufficient material, by me in the present work. The races and their ranges as given by the latter are correct as far as I can judge. However, geography and subspecific characters do not always work together. Thus, to take but a few examples: Granvik[68] writes that three specimens from Soy, Kenya Colony, " * * * exhibit rather great differences in regard to the colours of the rectrices and upper tail coverts. And yet they are shot out of one and the same flock, whence it must be considered very likely that, in spite of the differences, they belong to the same form." When it is remembered that these are among the supposedly most reliable racial characters, the statement has all the more significance. Likewise Gyldenstolpe[69] writes that the majority of birds from the eastern Belgian Congo are intermediate between *afer* and *rufobuccalis*, but typical examples of both occur there as well. Lastly, I would draw attention to the fact that Mearns collected a specimen of *praedi* in the same spot (Loco) and on the same date as one of *aethiopicus*.

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[64] Journ. f. Ornith., 1905, pp. 184–186.

[65] Syst. Avium Ethiop., 1924, pp. 208–209.

[66] Ibis, 1919, pp. 673–674.

[67] Rev. Zool. Africaine, vol. 10, 1922, pp. 149–151.

[68] Journ. f. Ornith., 1923, Sonderheft, p. 97.

[69] Kungl. Sv. Vet. Akad. Handlgr., 1924, pp. 280–282.

These three cases are mere samples of what one finds; they are not unusual in any sense. It might therefore seem as though the racial characters were not constant and the forms not valid, but the situation is much complicated by the fact that the birds are much given to wandering considerable distances when not breeding and so two forms, which, when breeding, may be geographically distinct, may otherwise be found together. If collectors would only take the trouble to note in every case whether or not the specimens procured were in breeding condition at the time, the matter could be cleared up.

These wandering birds have caused many misidentifications, which, in turn, have caused many divergent opinions. Thus, Van Someren[70] writes that *aethiopicus* has the back darker than any other race of *afer*, while all other workers are agreed that while *afer* and *aethiopicus* are quite similar, the latter may be told by its lighter upper parts. Van Someren refers birds from Moroto and Kisumu to *aethiopicus* but the birds of that region are really *suahelicus*, or, at least, intermediate between *suahelicus* and *rufobuccalis*.

Although I recognize *praedi* I have little faith in its validity as dark-backed individuals occur somewhat sporadically in Ethiopia and Kenya Colony. The only reason why it is kept distinct here is that I hesitate to synonymize it without seeing at least as much material as that on which it was originally described. Likewise, I feel that further material may show that *afer* and *aethiopicus* are less distinct than now thought. The material available gives no clue to ages and molts, but the character of the upper tail coverts and central rectrices seems suspiciously like a matter of age.

Although several writers have suggested that this bird was somewhat migratory, their statements seem to have been based more on the hope that they could thereby account for the presence of different looking individuals in the same region than on any direct observational evidence. However, Grote[71] writes that Mikindani, Tanganyika Territory, the eastern race *suahelicus* is found only during the rainy season when it breeds, and after which it departs, usually arriving about the end of April.

EURYSTOMUS AFER PRAEDI Bannerman

Eurystomus afer praedi Bannerman, Bull. Brit. Orn. Cl., vol. 41, p. 70, 1921: Guatti, Ethiopia.

Specimens collected:
Male, Loco, Ethiopia, March 13, 1912.

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[70] Nov. Zool., vol. 29, 1922, p. 74.
[71] Journ. f. Ornith., 1912, p. 525.

This specimen is much darker above than any of the series of *afer* or *aethiopicus* examined, and, until *praedi* is definitely shown to be unrecognizable, is best referred to the present race. It may be more correct to say it is intermediate between *aethiopicus* (or *afer*?) and the characters given for *praedi*, but is nearer the latter. I have seen one other like it—a male from Hora Daka, Arussi district (Kovács collection), now in the Museum of Comparative Zoölogy. The latter specimen has the central upper tail coverts deep bluish, while the former has them with the whole inner web rufous brown, the outer web deep bluish black. *E. a. praedi* is said to have them dark blue (almost black in the type), but I doubt the geographic constancy of this character. Van Someren[72] writes that his Moroto and Kisumu birds have the upper tail coverts dull blackish blue, the central ones brownish tinged with blackish.

On geographic grounds the three specimens of *aethiopicus* collected by Mearns should be *praedi*, but they certainly are not, being lighter, not darker, above than *afer*.

Family UPUPIDAE

UPUPA EPOPS EPOPS Linnaeus

Upupa epops Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 117, 1758: Europe; restricted type locality, Sweden (Hartert).

Specimens collected:

Two males, two females, Dire Daoua, Ethiopia, December 5–15, 1911.

One male, one female, Sadi Malka, Ethiopia, January 28, 1912.

One female, Sirre, Ethiopia, February 13, 1912.

One female, Gidabo River, Ethiopia, March 17, 1912.

Upupa epops has been studied by so many ornithologists that there is little that I can add to its systematics. I have examined a series of 60 specimens (40 of the typical form and 20 of *somaliensis*) and find the brief statements of range given by Sclater[73] to be correct. As to the validity of *waibeli* of eastern Cameroon, I can not form an opinion as I have seen no material.

Nicoll[74] revived Brehm's name *major* for the resident form of Egypt which he found was separable from typical *epops* in having a longer bill. Hartert[75] recognizes *major* and figures the bill, which is noticeably heavier than in *epops*. Sclater does not mention it, but this is not to be construed as meaning that he considers it identical with *epops*, but is due to the fact that lower Egypt is not in the

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[72] Nov. Zool., vol. 29, 1922, p. 74.

[73] Syst. Avium Ethiop., 1924, p. 232.

[74] Ibis, 1909, p. 483, and Bull. Brit. Orn. Cl., vol. 23, 1909, p. 100.

[75] Vög. pal. Fauna, vol. 2, p. 869.

Ethiopian region. I have seen no *major*, but none of the *epops* examined approach the figure given by Hartert for the former race.

The typical race of this species is known in the region occupying our attention in this report only as a winter visitor from the north. Meinertzhagen[76] has summarized what is known of it in East Africa. He finds that the birds begin migrating from their breeding grounds in Armenia in early August and the flights continue through September. They arrive in Egypt during the last third of August and continue to arrive until the end of September. In the Sudan they appear in numbers in September and remain for the winter, becoming scarcer toward the south (Bahr-el-Ghazal region). Birds occur in northern Somaliland during the last days of September, all of October, and the first half of November. In Kenya Colony they are decidedly scarce. Meinertzhagen obtained one on Mount Kenia on November 23, Turner secured another on Lake Rudolf on March 13, Van Someren procured one at Kyambu and one at Naivasha, and there is a record for Uganda and one for Turkanaland. According to Meinertzhagen the northward migration begins in early March, the latest dates for the Sudan being May 2 and 4 (Port Sudan) and May 24 (Khartoum). Grant[77] writes that two specimens were taken in Somaliland in July and September, and two in Ethiopia in August, so it appears that a few individuals may stay behind. Such birds are, however, probably sick or wounded individuals that are unable to migrate.

The molting process in this bird (as shown by 40 specimens) apparently bears no definite relation to the migration. Some birds complete the postnuptial molt before leaving the breeding grounds, while others arrive in Ethiopia and the Sudan in worn nuptial dress or in various stages of molt. The order of replacement of the remiges is noteworthy because of its irregularity. For example, two of the birds collected at Dire Daoua early in December were molting the primaries. One has replaced the innermost ones and the outermost two, the other has replaced all but the outermost three pairs. I have not been able to detect any sign of a prenuptial molt.

It seems then, that the actual breeding is done in worn plumage (which differs from that of the winter only by abrasion), exactly the opposite of what takes place in *Upupa africana*. Aside from the general interest attached to such a diametrically opposite condition in these two congeners, this is another argument in favor of the specific distinctness of the two.

The size of the adults is variable, but not more so than in most birds. Males have wings 139–152, tails 98–106, and bills 51–62 millimeters in length. The measurements of the females are similar: Wing 138–149, tail 96–103, bill 51–56 millimeters.

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[76] Ibis, 1922, pp. 48–50.

[77] Idem, 1915, p. 278.

UPUPA EPOPS SOMALIENSIS Salvin

Upupa somaliensis SALVIN, Cat. Birds Brit. Mus., vol. 16, p. 13, 1902: Somaliland.

Specimens collected:

Four males, four females, two unsexed, Dire Daoua, Ethiopia, December 1–22, 1911.

One unsexed, Chobi, Ethiopia, December 23, 1911.

One male, one female, Gato River near Gardula, Ethiopia, March 31 and April 1, 1912.

Three males, Yebo, Ethiopia, June 21, 1912.

This race of the hoopoe occurs across Africa south of the Sahara and north of the Upper and Lower Guinean forested areas, from Senegal and the Sudan to Ethiopia, Somaliland, Bogosland, Eritrea, Kenya Colony, and northern Uganda. Sclater[78] does not include Kenya Colony in its range, but it occurs right across that country to the border of Tanganyika Territory. It does not appear to have been recorded from the latter country except in the country around the base of Mount Kilimanjaro and Mount Meru. Abbott procured one on the Usseri River on the eastern slope of Kilimanjaro, and Sjöstedt obtained others at Kibonoto, Ngare nairobi, and Ngare na nyuki.

From the typical form, *somaliensis* differs in having more and deeper rufescent pink on the breast and mantle and in having little or no white just proximal to the black tips of the crest feathers. However, the latter character is more variable, and hence less reliable, than the former. This race is the one generally referred to in literature as *senegalensis*, but as Hartert has shown[79] *senegalensis* Reichenow is preoccupied by *senegalensis* Swainson which is a synonym of *epops*. There is some slight doubt, however, as to whether Swainson's name is really based on a typical European winter bird, as his type, while pale in color, has no white on the crest, and may therefore be a faded *somaliensis* (which, if true, would have to be called *senegalensis*) or a somewhat aberrant example of *epops*. Under the circumstances the wisest policy is to consider *senegalensis* a synonym of *epops* and use Salvin's name *somaliensis* for the present race, as has been done by Hartert, Sclater, and others.

Upupa intermedia Ogilvie-Grant and Reid[80] is a synonym of *somaliensis*. *Upupa butleri* Madarász[81] is also not recognizable and is considered as a synonym of typical *epops* by Hartert, as a synonym of *major* by Claude Grant [82], and of *somaliensis* by Sclater and Mackworth-Praed.[83] I have seen two birds from the Blue Nile, both of which are of the typical race, and, inasmuch as Madarász described *butleri* from winter birds, it seems that Hartert is correct in his disposition of the name.

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[78] Syst. Avium Ethiop., 1924, p. 232.

[79] Vög. pal. Fauna, vol. 2, p. 870.

[80] Ibis, 1901, p. 674: S. Abyssinia.

[81] Ann. Mus. Nat. Hung., vol. 9, 1911, p. 339: Chor-Em-Dul, Blue Nile.

Claude Grant [82] writes that in, "* * * * most males the basal two-thirds of the secondaries is pure white, though this is not constant, and in most females the white two-thirds of the secondaries is crossed by two black bands, though this also is not always constant." Assuming that the birds available for the present study are correctly sexed, I should say that the degree of variation in this regard is almost enough to destroy the truth of Grant's generalizations. Curiously enough, he himself takes pains to show the variability of the birds in this regard when he relegates *intermedia* to synonymy. The only thing that may be said with reference to the distribution of black and white in the secondaries is that the basal white area (extending distally to the most proximal black band) averages wider in males than in females. A variation that appears to be unrecorded has to do with the outermost primary. In 3 out of 20 birds examined this feather is wholly black; in the others it has a white spot of varying size on the inner web.

The size variations are tabulated below. The small birds of either sex are probably young, but as it is difficult to tell the age from the plumages this must be regarded only as a supposition.

Locality	Sex	Wing	Tail	Culmen
Ethiopia:				
Dire Daoua	♂	140. 0	98. 0	52. 0
Do	♂	137. 0	96. 0	53. 0
Do	♂	137. 0	102. 0	52. 0
Do	♂	148. 0	102. 0	49. 0
Maraco	♂	144. 0	105. 0	45. 0
Do	♂	138. 0	87. 0	38. 0
Dembelto, Arussi	♂	142. 0	84. 0	62. 5
Yebo	♂	139. 5	102. 0	44. 5
Do	♂	144. 5	96. 0	56. 0
Do	♂	138. 5	100. 0	43. 0
Gato River near Gardula	♂	141. 0	101. 0	51. 0
Dire Daoua	♀	136. 0	-------	56. 5
Do	♀	133. 0	95. 0	50. 0
Do	♀	132. 0	93. 0	48. 0
Do	♀	128. 0	91. 0	50. 0
Gato River near Gardula	♀	130. 0	91. 0	48. 5
Chobi	------	135. 0	94. 0	52. 0
Dire Daoua	------	137. 0	101. 0	57. 5
Do	------	131. 0	91. 5	47. 0
British Somaliland, Sheik	♀	131. 0	95. 0	50. 0

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[82] Ibis, 1915, p. 278.

[83] Idem, 1919, p. 666.

One of the females from Dire Daoua is molting the rectrices but not the remiges; one of the males from the same locality is in complete fresh plumage, except for a few of the anterior crest feathers which are just sprouted and beginning to burst from their sheaths.

Mearns noted 50 of these birds during his stay on the Gato River, March 29 to May 17, and 10 at the Abaya Lakes, March 18–26.

UPUPA AFRICANA Bechstein

Upupa africana Bechstein, Kurze Uebers., vol. 4, p. 172, 1811: Congo to the Cape.

Specimens collected:

Four males, Lekiundu River, Kenya Colony, August 4–8, 1912.

The African hoopoe occurs from South Africa north to the Congo forest area, and, in eastern Africa, through Tanganyika Territory, Uganda, and Kenya Colony to southern Ethiopia, where Zaphiro procured it at Wandu. It is not definitely known from Somaliland or Jubaland, but it may possibly occur there. It is not divisible into geographic races, *U. a. maior* Reichenow being merely an unusually large example of *africana.* Van Someren [84] regards *africana* as a race of *epops* but the absence of the white bar on the primaries of the former is so striking a difference between it and the latter, in which a broad white band is present, that it seems more natural to consider them specifically distinct. It is true, however, that the breeding ranges of the two are geographically distinct. Lönnberg [85] has pointed out that although there is never any white on the primaries in *africana*, the extent of white on the secondaries is very variable, some specimens having more than the basal half of these feathers white and only one white bar across the black distal part, while others have these remiges black with three white bars, the two proximal ones very broad, the most distal one narrow. Judging from a series of 17 specimens examined I should say the former condition is the usual one in this species. Claude Grant [86] has disposed of the synonyms of this bird and has considered the case of *Upupa waibeli* in this connection. The latter is, however, a form of *epops* if it is valid at all, but certainly not of *africana.*

This hoopoe is quite variable in color, males being darker than females as a rule. It seems that a larger amount of material might show southern birds (north to central Tanganyika Territory) to be somewhat paler in general than northern ones (from Kenya Colony), but with the series at hand I can not attempt any subspecific differentiation.

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[84] Nov. Zool., vol. 29, 1922, p. 81.

[85] Kungl. Sv. Vet. Akad. Handlgr., vol. 48, 1911, p. 76.

[86] Ibis, 1915, pp. 279–281.

Reichenow[87] gives the size of this bird as wing 130–142 (153 in *maior*), tail 95–100, culmen 48–54 millimeters. Eleven adult males from Kenya Colony and Tanganyika Territory measure as follows: Wing 126–149 (average 139); tail 85–100 (95.5); culmen 47–57 (53.1) millimeters.

Young birds are duskier, more grayish, than adults, and have the abdomen white broadly streaked with dark earth brown. As far as I can see there is no difference in color between the sexes in juvenal birds, but Van Someren[84] writes that young males average darker than females of corresponding age.

In Kenya Colony the birds are mostly in fresh plumage by the middle of August, some as early as late July. The wing molt begins at the carpal joint and proceeds in both directions from that point.

The breeding season in Kenya Colony seems to be in August and September, as Van Someren[88] found a pair with young in first plumage at Nairobi in October. It would therefore appear that the birds breed in fresh plumage, which, because of their habit of nesting in holes, becomes quickly abraded. It would be interesting to know if the postnuptial molt is complete, or if the birds retain the worn remiges and rectrices throughout most of the year. The material examined gives no suggestion of a postnuptial molt, but definite data on this point are lacking. The chances are that the postnuptial molt is a slow, prolonged process, but is probably complete.

Mearns observed this hoopoe at the following localities: Yebo, June 20, 4 birds seen; plains at base and south of Endoto Mountains, July 21–24, 1 noted; Lekiundu River, August 4–8, 4 seen; Tana River, August 17, 1 bird; Athi River, August 29, 3 seen.

Family PHOENICULIDAE

PHOENICULUS PURPUREUS MARWITZI (Reichenow)

Irrisor erythrorhynchus marwitzi Reichenow, Orn. Monatsb., vol. 16, p. 171, 1906: Makalama, Kondoa Irangi district, Tanganyika Territory.

Specimens collected:

One immature male, one immature female, one adult female, Northern Guaso Nyiro River, Kenya Colony, August 2–3, 1912.

The material available for study is not sufficient either in number of specimens or in the data accompanying them to attempt a systematic revision of the races of this kakelaar, and I therefore follow Sclater's arrangement[89] which appears to be correct as far as my material goes. In the region covered by the present collection two forms are known to occur and their ranges are as follows:

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[84] Nov. Zool., vol. 29, 1922, p. 81.

[87] Vög. Afr., vol. 2, p. 336.

[88] Ibis, 1916, p. 249.

1. *P. p. marwitzi.*—Eastern Africa from Mashonaland, northern Mozambique, the southern Katanga, Nyasaland, and Tanganyika Territory north to the Northern Guaso Nyiro River in Kenya Colony and to eastern Uganda. Sclater[89] writes that in Kenya Colony its range is from Mombasa to the Rift Valley (based on Claude Grant's statement,[90] but Van Someren[91] records specimens from Kisumu, and from several localities in Uganda (Mubango, Lugalambo, Elgon, and Kimiriri River), so the Rift Valley can not be considered the western boundary of its range. Claude Grant records

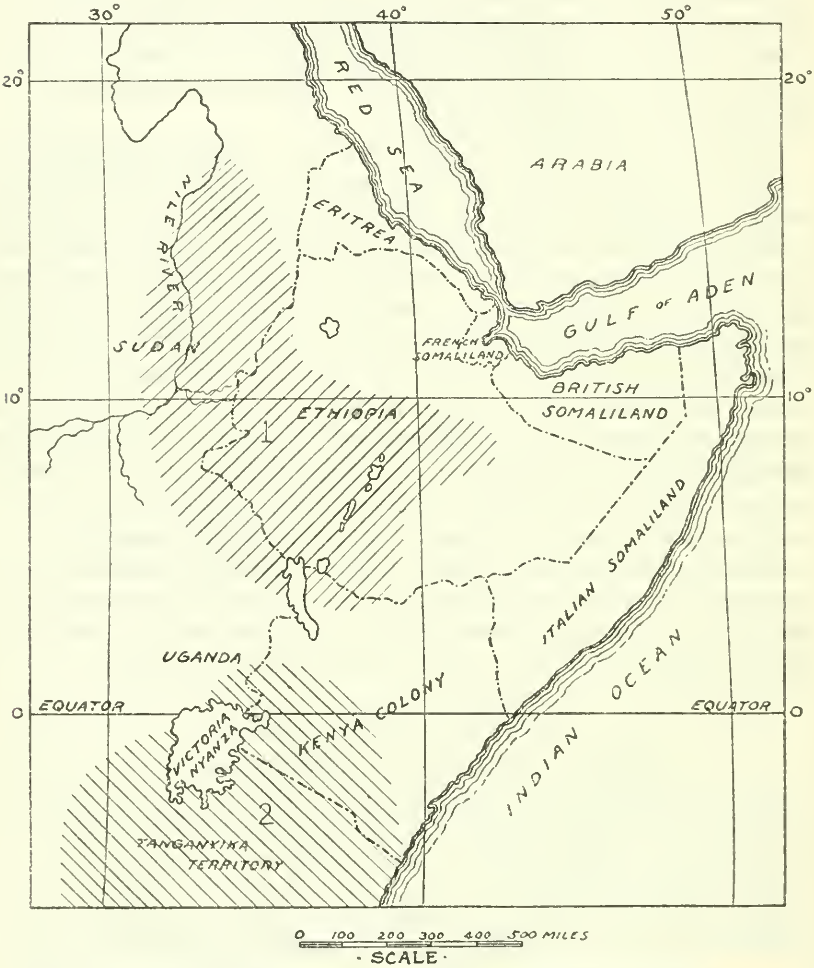

FIGURE 11.—DISTRIBUTION OF PHOENICULUS PURPUREUS IN NORTHEASTERN AFRICA: 1, PHOENICULUS PURPUREUS NILOTICUS; 2, PHOENICULUS PURPUREUS MARWITZI

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[89] Syst. Avium Ethiop., 1924, p. 233.

[90] Idem, 1915, p. 286.

[91] Nov. Zool., vol. 29, 1922, p. 82.

marwitzi from the Turkwell River, but Van Someren calls birds from there *niloticus.* Reasoning by analogy with the distribution of races of other birds it would appear that both may be correct; that is, that Turkwell is intermediate country and the birds are intergrades between the two races. The extent of intergradation varies as usual, and consequently individual specimens would be found that might be considered nearer to one or the other.

The fact that *marwitzi* extends northward along the coast into Somaliland is a point that has not been recognized hitherto. However, Elliot[92] records five red-billed "*Irrisor erythrorhynchus*" from Hullier and Le Gud, northern Somaliland.

Sclater, following C. Grant, considers *brevirostris* Gunning and Roberts (type locality Boror, Mozambique) a synonym of *marwitzi.* While I have no material from Mozambique at present, I remember Mr. Roberts showing me the series in the Transvaal Museum some six years ago and that the bill character appeared to be a good one. He upholds this form in his recent check list[93] and I am not inclined to disagree with him. The birds of the Zambesi valley in Mozambique would belong to this race, and not to *marwitzi.* Sclater writes that *marwitzi* occurs south to Natal. However, Natal birds are more or less intermediate between *marwitzi* (or *brevirostris*) and *purpureus,* and, if anything, nearer the latter.

2. *P. p. niloticus.*—The drainage basin of the Nile south to the Bahr el Ghazal, east through southwestern Ethiopia (to Shoa) to the northwestern frontier of Kenya Colony (south to the Endoto Mountains). This subspecies differs from *marwitzi* in being duller and darker than the latter; the mantle and breast somewhat bluer, the underside of the wings bluer, not greenish as in *marwitzi.*

The immature female listed above has the bill black, and has the throat feathers metallic green, margined with pale tawny. However, the other young bird and another examined have the feathers of the chin and throat entirely tawny brown, a few new metallic feathers coming in among them. It appears then, that the immature female collected by Mearns is in first "adult" plumage, and the male (with the solid brown throat) a juvenal bird. Three specimens in the present collection are much less greenish on the breast and mantle than any others from Kenya Colony and Tanganyika Territory examined by me. One can not help but wonder if they may not be hybrids between *marwitzi* and *granti.*

Adult males vary in size as follows: Wing 139–142.5; tail 198–226; culmen 40–48.5 millimeters. Female: Wing 134–148; tail 200–229.5; culmen 36.5–43 millimeters.

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[92] Field Columbian Mus. publ. 17, ornith. series, vol. 1, No. 2, 1897, p. 54.

[93] Annals Transv. Mus., vol. 10, 1924, p. 149.

Subadult birds differ from older ones in having a bronze-colored gloss instead of a greenish sheen as in the latter.

The breeding season in Kenya Colony appears to be in July. Van Someren found a female with nestlings on July 23. This bird had the whole of the lower bill black and was, according to the collector, "perfectly adult."

Mearns noted this kakelaar as follows: Tharaka district, August 12–13, 45 seen; Tana River, August 14–23, 90 birds; Tana River at mouth of Thika River, August 23, 10 seen; Athi River, August 29, 15 birds.

PHOENICULUS PURPUREUS NILOTICUS (Neumann)

Irrisor erythrorhynchus niloticus NEUMANN, Orn. Monatsb., vol. 11, p. 181, 1903: Goz Abu Guma, White Nile.

Specimens collected:

Two adult males, one immature female, Hawash River, Ethiopia, February 10–13, 1912.

One adult male, Endoto Mountains, Kenya Colony, July 23, 1912.

Soft parts: Iris dark brown; bill red.

The Endoto specimen, the third recorded from Kenya Colony, is more or less intermediate between true *niloticus* and *marwitzi* but nearer the former. Claude Grant [94] writes that the southern limits of the range of *niloticus* are Lakes Stefanie and Rudolf, so the present specimen extends the range of the race southeastward for a small, but noteworthy, distance. Neumann [95] found *niloticus* in Shoa, Van Someren [96] obtained one on the Kobua River, west of Lake Rudolf, and later [97] on the Turkwell River, Lake Rudolf, Kobua River, and Mount Moroto. Granvik [98] lists *niloticus* from Mount Elgon, but he writes that his specimen had the underside of the wings predominantly green, not blue, and I therefore consider his record as really referring to *marwitzi*. Quite naturally under the circumstances, he appears to have had some doubts as to the validity of *niloticus* and even hints that it may be based on age characters of *marwitzi*. Granvik also lists *marwitzi* from Mount Elgon, and so does Van Someren. It is highly unlikely that two races of the same species would occur together, especially so in a nonmigratory bird like the present one.

The three birds from Hawash River constitute an eastern extension of range from Neumann's Aveve record. The two adults are not fully adult as they have the maxillae blackish.

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[94] Ibis, 1915, p. 285.

[95] Journ. f. Ornith., 1905, p. 194.

[96] Journ. E. Afr. Ug. Nat. Hist. Soc., 1921, no. 16, p. 30.

[97] Nov. Zool., vol. 29, 1922, p. 82.

[98] Journ. f. Ornith., 1923, Sonderheft, p. 111.

Neumann noted that his male bird from Aveve, Kollu Province, had slightly less gloss on the feathers than typical *niloticus* from the White Nile. The specimen from the Endoto Mountains is similarly somewhat duller than one from the Blue Nile, but the difference is slight and wholly within the range of individual variation. It has, however, a shorter bill than the Blue Nile bird. Both are fully adult males (with red bills), and their measurements are as follows:

Endoto Mountains.—Wing 152, tail 236, culmen 52.5 millimeters.

Blue Nile.—Wing 155, tail 226, culmen 57.0 millimeters.

The two black-maxillaried adults from the Hawash River have the throat decidedly more purplish, less bluish than the two fully adult birds. Whether this is due to age or is a geographic character I can not say. These two birds have the following measurements: Wing 143–147, tail 195+–217+ (both worn), culmen 53–55 millimeters.

The young bird is in an early stage of the postjuvenal molt. The head and entire body are dull fuscous brown, the rectrices and remiges are similar to those of the later plumages. New purplish feathers are sprouting on the interscapulars and a few bluish ones on the crown and throat. The postjuvenal molt is incomplete in that the juvenal wing and tail quills are retained in the immature plumage. Reichenow,[99] in describing the young of the typical race, writes that the remiges and rectrices are similar to those of the adults, but bluish green, less pure bluish. This does not appeaar to hold for *niloticus*.

The Endoto Mountains bird was molting the rectrices when shot; the next to the middle pair being new and only partly grown. The same is true of one of the Hawash River males.

C. Grant considers *neglectus* a synonym of *niloticus*, but the two have nothing to do with each other, the former being a valid race of *Phoeniculus somaliensis*.

According to Lynes[1] the present bird is an inhabitant of sylvan rather than of bushy country and breeds in autumn in the Darfur region of the Sudan. The probabilities are that the same statements are applicable to the birds farther east.

PHOENICULUS GRANTI (Neumann)

Irrisor damarensis granti NEUMANN, Orn. Monatsb., vol. 11, p. 182, 1903: Ngomeni, Ukamba, Kenya Colony.

Specimens collected:

Female adult, Tharaka district, Kenya Colony, August 13, 1912.

Male adult, Tana River, Camp No. 6, Kenya Colony, August 21, 1912.

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[99] Vög. Afr., vol. 2, p. 339.

[1] Ibis, 1925, p. 377.

Male immature, Boulder Hill, Thika River, Kenya Colony, August 28, 1912.

Male adult, female adult, between Thika and Athi Rivers, Kenya Colony, August 29, 1912.

Soft parts: Feet red, bill red; claws brownish black.

Phoeniculus granti has always been considered a geographic form of *Phoeniculus damarensis*, which would then contain two subspecific groups, as follows:

1. *P. d. damarensis.*—Known only from Damaraland.
2. *P. d. granti.*—Kenya Colony from the Amala River to Takaungu on the coast, north to Lakes Rudolf and Stefanie and to middle Omo Valley, in Ethiopia. It differs from *damarensis* in having the crown, nape, mantle, and breast deep violet instead of purplish bronze; the lower throat is brighter green in *granti*, and the white spots in the wings and tail smaller than *damarensis*. However, there are no intermediates known between them, and while they look, and are, closely related, the actual geographic void between them is so enormous as to raise very serious doubts with regard to their conspecificity. A species breaking up into two well-marked forms separated from each other by not less than 2,000 miles with an allied species (in this case *purpureus*) occupying the intervening country is a very difficult thing to imagine. If no allied form occurred between them it would be less difficult to force one's self into the conviction that may be, after all, the two were only subspecifically distinct. One has only to think of the numbers of mountain birds found on Cameroon Mountain, Ruwenzori, Kenia, and Kilimanjaro to bring to mind cases of races geographically isolated by tremendous distances, but in all these instances there is a good ecological reason for their absence in the intervening country, which is much lower and therefore climatically different. Although I have seen no material of *damarensis*, I feel that if nomenclature is to reflect biological facts (or as near to actual facts as possible) it is better to use binomials in a case like this.

From *P. purpureus* and its races, the present species may be distinguished by its deep violet-blue head and back and breast, which, in the former are bright, metallic green. From *P. somaliensis* it differs in having a red bill in the adult stage. The immature plumages of the three species of *Phoeniculus* are far from well known. In fact, of the few statements that have been made about them, more are based on guesses than on knowledge. Claude Grant[2] writes that it, "* * * is with the young and immature specimens that difficulty is experienced, but even these, when the eye has grasped the differences between the adults, can be picked out and put into their proper place." It would have been more to the point to say that they could be picked out according to the preconceived notion of the student and put where they best fitted that notion. I have studied these birds without any preconceived ideas, and find that after examining them carefully (some 63 specimens in all) I have no ideas, preconceived or otherwise, that enable me to do anything definite with regard to subadult birds. The best I can do is to guess and it happens that my guess is the same as that of Grant. I assume, for instance, that the immature male listed above is *granti* rather than *P. purpureus marwitzi* because it has no green at all on the nape, mantle, or breast, and that it is not a race of *somaliensis*, merely because the latter species is not known to occur as far south as the Thika River, and because this specimen has the throat deep purple, while two correspondingly young individuals from southern Ethiopia, collected together with adults of *somaliensis* lack this purple color.

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[2] Ibis, 1915, p. 282.

Zedlitz[3] considers *somaliensis* and *damarensis* conspecific, the former being a race of the latter. This certainly seems improbable as then *granti* and *somaliensis* would be the same bird, but they are not. Adults from British Somaliland, which, by locality, can not possibly be anything but typical *somaliensis*, have black bills, while adults of *granti* have red bills and are more and brighter greenish on the breast, more violaceous above. Van Someren[4] writes that the majority of adults of *granti* have black and red bills, but that very old individuals have bright red ones. A series of 14 *granti* examined fails to corroborate this. All fully adult birds seen by me have red bills.

The size variations of adults may be judged from the following table:

Locality	Males			Females		
	Wing	Tail	Culmen	Wing	Tail	Culmen
Kenya Colony:						
Tana River	139. 5	184. 0	51. 0	148	226. 0	55. 0
Between Thika and Athi Rivers	150. 0	234. 0	51. 5	135	217. 5	42. 5
Tharaka district	------	------	------	137	210. 0	42. 0
Ithanga Hills	139. 0	193. 0	50. 0	------	------	------
Do	140. 0	209. 0	42. 5	------	------	------
Do	143. 5	205. 5	48. 0	------	------	------
Taveta	136. 5	198. 0	40. 0	------	------	------
Kazita River	142. 5	226. 0	------	------	------	------
0° 8′ N., 38° 45′ E	144. 5	227. 0	48. 5	------	------	------

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[3] Journ. f. Ornith., 1910, p. 778; 1915, p. 33.

[4] Nov. Zool., vol. 29, p. 82.

Two of the birds collected are in molt. The female from the Tharaka district, August 13, has the third primary (from the outside) only an inch or so in length, but the ones immediately proximal and distal to it are old and worn, suggesting that the molt began at the third primary as well as at the carpal joint, for the innermost primaries are new. This bird also shows a peculiarity in the tail molt. The left member of the middle pair of rectrices is new and about one-sixth grown, while the old, worn right member is still present. In the case of the next pair of rectrices the opposite is true. The male taken on August 21 on the Tana River has completed the wing molt but the ecdysis of the tail is still in process, the order of feather replacement is irregular as in the female.

The color of the throat is variable; some adults have the upper part decidedly bluish, others greenish, and the lower throat and upper breast is greenish in some, reddish purple in others. The variations are purely individual. A variation of some interest in connection with the racial characters of another species (*purpureus*) is the color of the underside of the wings which is greenish in some and bluish in others.

PHOENICULUS SOMALIENSIS NEGLECTUS (Neumann)

Irrisor erythrorhynchus neglectus Neumann, Journ. f. Ornith., 1905, p. 194: Ula, Shoa.

Specimens collected:

Three adult males, one adult unsexed, Dire Daoua, Ethiopia, November 30 to December 20, 1911.

One adult male, Moulu, Ethiopia, December 17, 1911.

Eight adult males, 6 adult females, one immature male, one immature female, Gato River near Gardula, Ethiopia, March 30 to April 10, 1912.

One adult male, Bodessa, Ethiopia, May 26, 1912.

One adult male, Sagon River, Ethiopia, June 4, 1912.

Soft parts: Iris dark brown; bill entirely black, red on the inside and at the angle of the mouth and the inferior point at the base of the mandible; feet red to orange red; claws plumbeous black.

Owing to lack of adequate material from all parts of its range, I can not attempt a revision of the races of this kakelaar and therefore follow Sclater's arrangement.[5] There still is considerable diversity of opinion as to whether *somaliensis* is a species or an age form of *purpureus*, but all the evidence points to the two being specifically distinct. *P. somaliensis* has been divided into three subspecies—*somaliensis*, *neglectus*, and *abyssinicus*. I have seen but 1 specimen of *somaliensis*, 1 of *abyssinicus* (not fully adult at that), and 24 of *neglectus.* The typical form has the upper throat dark steel blue, the nape and upper back velvety black glossed with dull purplish blue; between *neglectus* and *abyssinicus* I can see no difference, but this may be due to the paucity of material of the latter examined. Zedlitz[6] states that the upper back and mantle are slightly more greenish in *neglectus* than in *abyssinicus*, and that the former is brighter earth green on the underparts than the latter. Hartert[7] writes that while—

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[5] Syst. Avium Ethiop., 1924, p. 234.

> * * * *P. e. niloticus* Neum. appears to be well distinguishable, his *neglectus* seems to be founded on younger black-billed specimens, but of *abyssinicus* no entirely red-billed example seems to be known; though the supposed colour differences of *abyssinicus* from *niloticus* (and *neglectus*) do not hold good, it must be kept separate, until red-billed birds in the countries inhabited by it are found—if they should exist. Doubtless the bills of *niloticus* become red much later than those of other red-billed subspecies, but they do become red in old birds.

Hartert considers these birds all forms of *purpureus.*

It seems to me that one cause for confusion between *abyssinicus* and *neglectus* is the fact that the former occurs (according to Neumann) in the highlands of central and southern Ethiopia where it is surrounded in the lower country by *neglectus*, and intergrades probably occur on the slopes of the mountains all through the range of the latter. It may be for this reason that Sclater restricts *abyssinicus* to Eritrea and northern Ethiopia, although in his original description Neumann gave the range as the Abyssinian highlands from Bogosland south to the mountains of southern Ethiopia. However, Neumann himself[8] later restricted *abyssinicus* to the same area that Sclater did. However, if the reason for this restriction was that suggested above, then that arbitrary action is merely an artificial way out of a complex and difficult situation and is not a true solution. We should be prepared to find two forms with an unusually high percentage of intergrades. The real question is whether it serves any purpose to attach names to forms that interdigitate and blend so extensively. I can not answer the question without seeing additional northern material.

The birds of extreme southern Ethiopia are somewhat intermediate between *neglectus* and *somaliensis* (Gato River, Bodessa, and Sagon River specimens).

This wood hoopoe is a bird of the thorny bushy thickets and is found in pairs or small groups, and is apparently quite similar in its general habits to the more widely ranging *P. purpureus.*

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[6] Journ. f. Ornith., 1910, pp. 778–779.

[7] Nov. Zool., vol. 31, 1924, p. 114.

[8] Journ. f. Ornith., 1905, p. 195.

Erlanger[9] found a nest with three young at Belauer (between Jeldessa and Harrar) on March 3. Mearns collected two partly grown juvenal birds at Gato River near Gardula on March 31, so it appears that the breeding season in Somaliland and Ethiopia is in February and March.

The sequence of plumages and molts is as follows:

1. *Natal down.*—Not known. It is quite likely that it is light slate gray as one of the juvenal birds has a few such downy feathers attached to the distal ends of some of the abdominal juvenal ones.

2. *Juvenal plumage.*—Acquired by a complete post natal molt. Forehead, crown, cheeks, lores, auriculars, nape, scapulars, interscapulars, back, rump, upper tail coverts, dull black with a bluish or deep greenish-blue wash, the wash most pronounced on the head; throat and chin bluish black, the feathers broadly margined with buff or tawny buff; lower throat and breast black with a bluish or violet wash; rest of underparts dull black; remiges and rectrices as in adults—bluish or greenish blue with a metallic sheen, the feathers with white spots as in older birds.

3. *Immature plumage.*—Acquired by an incomplete postjuvenal molt, the juvenal wings and tail being retained. Similar to the adult but the throat black with a dull deep purplish-blue sheen and the crown without any greenish or coppery feathers. This plumage is worn for about half a year and during the latter part of its duration the juvenal remiges and rectrices are shed. Finally the body feathers are replaced giving rise to the—

4. *Adult plumage.*—This is too well known to need redescribing. This plumage can be told from the preceding by the greenish gloss on the feathers of the upper throat and the minute coppery and greenish feathers spangled among the blue-black ones on the forehead and crown.

One of the immature or subadult birds from Dire Daoua has several white feathers on the throat, an aberration of interest in connection with the related species *P. bollei* in which the throat and crown are always white or whitish in the adults. As already noted, *P. purpureus* also exhibits a tendency to produce white throat feathers.

The molting season for adults begins around the end of the breeding season. Five of the adults taken near Gardula were molting either the remiges or the rectrices. On the other hand, immature birds shed these feathers in November. The wing molt precedes the tail molt and, in fact, the replacement of the remiges is almost completed before the rectrices are shed. As in so many coraciiform birds there are two centers from which the wing molt advances—

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[9] Journ. f. Ornith., 1905, p. 463.

the carpal joint and the fifth or sixth primary, the latter being decidedly later in origin than the former. The tail molt is more or less centrifugal but in some cases it seems to begin not with the central rectrices but with the next pair.

The size variations of adults are shown in the following table:

Locality	Males			Females		
	Wing	Tail	Culmen	Wing	Tail	Culmen
Ethiopia:						
Gato River	154. 5	236. 0	53. 0	143. 5	213. 0	41. 5
Do	150. 5	228. 0	57. 0	144. 5	221. 5	41. 0
Do	146. 5	216. 0	53. 0	140. 0	203. 0+	41. 0
Do	154. 5	229. 5	53. 5	145. 0		42. 0
Do	156. 5		56. 5	144. 0	217. 0	44. 0
Do	150. 0	228. 0	54. 0	141. 5	208. 0	40. 0
Do	152. 0	231. 0	56. 0			
Do	147. 0	207. 5	54. 5			
Dire Daoua	158. 5		59. 0			
Do	149. 5	220. 0	59. 0			
Moulu	145. 0		54. 0			
Sagon River	152. 0	232. 0	56. 5			
Bodessa	148. 5	219. 0	53. 0			
Maraco				139. 5		41. 0

Mearns observed this bird at the Abaya Lakes, March 18–26, where he noted 4 birds; on the Gato River, March 29 to May 17, 100; Bodessa and Sagon River, May 19 to June 6, 58 seen; and Mar Mora, June 15, 14 birds.

PHOENICULUS BOLLEI JACKSONI (Sharpe)

Irrisor jacksoni Sharpe, Ann. Mag. Nat. Hist., ser. 6, vol. 6, p. 503, 1890: Kikuyu country, Kenya Colony.

Specimens collected:

Male, Escarpment, Kenya Colony, September 5, 1912.

The white-headed kakelaar is currently considered to have two valid subspecies, as outlined by Claude Grant [10] and Sclater; [11] the typical one of the Gold Coast, Southern Nigeria and the country east to the Ubangi River, which has the head and throat deep buff in color, and the eastern race, *jacksoni*, of central Kenya Colony west to Elgon, Uganda, and the eastern Belgian Congo, in which the head and throat are whiter, less buffy than in *bollei*. I have seen no typical *bollei* and only a small series of *jacksoni* but my observations, together with those of Lönnberg,[12] Granvik,[13] and others indicate that the extent of individual variation is great. Van Someren,[14] on the other hand, feels that *jacksoni* may contain three races, as follows:

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[10] Ibis, 1915, p. 287.

[11] Syst. Avium Ethiop., 1924, pp. 234–235.

[12] Kungl. Sv. Vet. Akad.-Handlgr., 1911, pp. 76–77.

[13] Journ. f. Ornith., 1923, Sonderheft, pp. 111–114.

1. Uganda birds having the heads purer white, the back of the head and the mantle on the average bluer than in Kikuyu birds; wings (male) 125–131, (female) 123–127; bill from nostril (male) 26–38 millimeters.

2. Kikuyu to Molo and Escarpment (typical *jacksoni*); general color of hind head and mantle more golden green; wings 130–145 millimeters (not 140–144 as Granvik [13] misquotes); bills from nostril to tip (male) 35–41 millimeters.

3. Birds from Sherengani Hills, north end of Elgeyu Escarpment; males with a distinct bluish wash on the head and mantle; wings 120–133 millimeters; bill from nostril (male) 27–37 millimeters.

I find that the greenish or bluish sheen of the feathers is very variable in birds from one locality, and consequently that that character can not be used in the way Van Someren intimates. Granvik writes that the bluish color is characteristic of youngish birds and that older ones are greener. I find just the opposite to be true. The chances are that both young and old vary in this respect and that the difference of opinion is due to the particular specimens that happened to comprise the two series.

If we take the measurements of a series of seven adult males and five adult females (all from the region given by Van Someren for "typical *jacksoni*") we find the following:

Males: Wing 134–142.5 (average 138.5); tail 162–213 (average 198.4); culmen from base 40–52 (average 47.8 mm.)

Females: Wing 126–138 (average 130); tail 131–206 (average 185), culmen from base 34–47 (average 39.2 millimeters).

To make the bill measurements more comparable with those given by Van Someren, it may be mentioned that the total length of the culmen exceeds the distance from the anterior end of the nostril to the tip of the bill by from 8–12 millimeters.

This species may be distinguished from all the others of its genus by the fact that it has no white spots on the remiges or rectrices in any plumage stage. The white throat and head is also a good character, but this is somewhat variable, and in *P. purpureus* white feathers occur not uncommonly on the head region. An immature male *jacksoni* from Ngong, near Nairobi, in the Museum of Comparative Zoölogy (A. Loveridge coll.) has no white at all, the whole head and throat being glossy metallic green like the mantle and breast. Granvik [15] records a specimen which entirely lacks the white on the chin and throat, having only a very few (five or six) white feathers on the forehead.

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[13] Journ. f. Ornith., 1923, Sonderheft, pp. 111–114.

[14] Nov. Zool., vol. 29, 1922, pp. 82–83.

[15] Journ. f. Ornith., 1923, Sonderheft, p. 113.

The breeding season on Mount Elgon is in July according to Granvik, who found a nest with one young on the 22d of that month.

SCOPTELUS ATERRIMUS NOTATUS Salvin

Scoptelus notatus Salvin, Cat. Bds. Brit. Mus., vol. 16, p. 22, 1892: Northeast Africa; type in Brit. Mus. from Senafé.

Specimens collected:

Six males, two females, Gato River near Gardula, Ethiopia, April 1–24, 1912.

Neumann separated the birds of the southern Ethiopian lake region from those of the northern and central parts of the country under the name *maior*[16] on the basis of larger size and the presence of only a single, small white spot on the outermost pair of rectrices in the southern group. On geographical grounds all the specimens collected by Mearns should be *maior*, but that form is not separable from *notatus* and I consider Neumann's name a pure synonym of Salvin's earlier one. Neumann writes the wing length of *maior* is 113 millimeters, and Zedlitz[17] gives that of *notatus* as 96 to 100 millimeters. The present series have wing lengths of from 103 to 109 millimeters in the males and 96.5 to 102 millimeters in the females. The character of the white spot on the outermost rectrices is too variable to be of any use as a racial criterion. The figures illustrate the variation in the present series. Not only do individuals vary in the presence or absence, size, and shape of the white area, but, as may be seen, the right and left rectrices are not always alike in the same bird. Lynes[18] writes that in the country from Senegal to Darfur, variation in tail spots is not consistent with geography, but inasmuch as all his specimens lack tail spots it is difficult to know what he means by variation in this character.

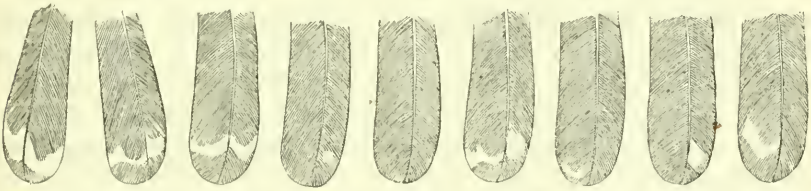

FIGURE 12.—OUTERMOST RECTRICES OF SCOPTELUS ATERRIMUS NOTATUS TO SHOW VARIATION. (THE TWO FIGURES AT THE EXTREME LEFT OF THE PAGE ARE A PAIR; THE OTHERS ARE EACH THE LEFT MEMBER OF A PAIR)

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[16] Journ. f. Ornith., 1905, p. 197.

[17] Idem, 1910, p. 779.

[18] Ibis, 1925, p. 378.

As far as I can make out the geographic variations of this bird, there are four recognizable forms, as follows:

1. *S. a. aterrimus.*—Upper Guinea from Senegal to Togoland. Grote[19] suggests that Cameroon birds may be distinct by virtue of larger size. I have seen no Cameroon material and can not form an opinion on this matter.

2. *S. a. emini.*—The Sudan and southern Sahara from Asben, Lake Chad, and the Shari Valley east through Darfur and Kordofan to the valley of the Nile from Sennar to Lake Albert in Uganda. Hartert's form *cryptostictus* is identical with *emini*, being based on first-year birds with obsolescent mirrors on the primaries. *Emini* differs from typical *aterrimus* in that the adults of the former lack the mirrors on the primaries (present in juvenal and immature birds). The former is said to be less violaceous above than *aterrimus*, but Lynes[18] finds no color difference between the two, and I find in *notatus* nearly as much variation in this respect as in the whole series examined from all parts of Africa.

3. *S. a. notatus.*—Eritrea and Ethiopia (south to the southern lakes region, but apparently not reaching Lakes Stefanie and Rudolf). This form differs from the first two in having white spots (usually) on the outermost pair of rectrices.

4. *S. a. anchietae.*—Angola. Characterized by broad white bars on the outer tail feathers, and by large average size (wing about 115 millimeters).

This species seems to be rather local and solitary, which accounts for its apparent scarcity in collections. It lives in bushy thickets, and being vocal only in the breeding season is an easy bird to miss. Lynes found that in Darfur *emini* molted in spring and early summer, "* * * and probably bred in autumn. * * *" This probably is true for *notatus* in Ethiopia as well, for five of the six males collected during April are molting the rectrices and remiges. The two females are juvenal birds in worn plumage. The tail molt is irregular, the variation in sequence of rectrix replacement being so great as to make it impossible to work out any semblance of a probable "normal" order. In the wings there are two centers of ecdysis, the carpal joint and the third from the outermost primary.

RHINOPOMASTUS CYANOMELAS SCHALOWI (Neumann)

Rhinopomastus schalowi NEUMANN, Journ. f. Ornith., 1900, p. 221: Usandawe, Tanganyika Territory.

Specimens collected:

Male adult, Tana River at mouth of Thika River, Kenya Colony, August 25, 1912.

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[18] Ibis, 1925, p. 378.

[19] Journ. f. Ornith., 1925, p. 880.

Claude Grant[20] has reviewed the systematics of this bird and his conclusions are supported by the series examined in the present connection. There are two valid forms, a short-tailed race, with no or only small, incomplete white spots on the outer rectrices—the typical one of southern Africa from Angola (north to the Quanza River) to the Orange River, Bechuanaland, the Transvaal, Natal, and western Matabeleland, and the northern from *schalowi* of East Africa from Lamu, and the Tana River in Kenya Colony west to Mount Elgon and Ruwenzori, south through the eastern Belgian Congo (Beni, the Ruzizi Valley, etc.), Uganda, Ruanda, Urundi, Tanganyika Territory, Mozambique and Nyasaland to Mashonaland and the northeastern Transvaal. This race differs from typical *cyanomelas* in having a longer tail with large, well developed white spots on the outer rectrices. Roberts[21] described the bird from the northern Transvaal under the name *intermedius*. This race, which is just what its name implies, is considered a synonym of *schalowi* by Grant, Sclater, and others. It is said to have the long tail of *schalowi* but with less white on the outer feathers. An adult male from the thornbush country of the Bushman's River, Natal, agrees with Robert's description, but as Grant has shown that the range of nongeographic variation in tropical East Africa is great enough to more than match a good series of *intermedius*, it is quite unnecessary to add a third group to the named forms of this species. The group that Roberts named is merely an aggregate of variables bridging the gap between the two valid subspecies.

Ogilvie-Grant,[22] in reporting on the birds collected by the Ruwenzori expedition, refers one specimen (out of 13 collected) to the typical southern race because the white subterminal marking on the two outer pairs of rectrices are reduced to small spots. It seems, however, more natural to regard this bird as an aberrant *schalowi* than as a possible migrant *cyanomelas*, especially since the latter is not migratory.

This bird occurs chiefly in the thorny bushveldt and Acacia savannas but also is found in forested areas, but never in the middle of dense woods. Its altitudinal range is from sea level to 7,000 feet (Mount Elgon—H. Granvik collection).

In Kenya Colony the majority of the birds molt in March and April but I have seen molting specimens taken in July and August and others as late as December.

The juvenal bird is dark brown on the head, mantle, throat, and breast, the feathers tipped with cinnamon brown; the abdomen is dull black; the back and rump black with a violet sheen; the wings and tail are similar to those of the adult. As already intimated the amount and extent of white on the rectrices are highly variable. Granvik[23] has figured some of the types found in his series, and these may all be matched by specimens examined by me. A variation that he does not mention, but that is discussed by Van Someren[24] is the number of greater upper primary coverts that are white. Most of the birds I have examined have the innermost one white, a few have others white as well, and one has all of these coverts blue. In the cases where more than one of the these feathers are white, there is great variation as to their position. In one bird the two innermost ones are white, while in another the innermost one is white, the next three blue, then another white one, etc.

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[20] Ibis, 1915, pp. 290–291.

[21] Ann. Transv. Mus., vol. 4, 1914, p. 171.

[22] Trans. Zool. Soc. Lond., 1910, p. 433.

RHINOPOMASTUS MINOR MINOR (Rüppell)

Promerops minor Rüppell, Syst. Uebers., p. 28, pl. 8, 1845: Shoa.

Specimens collected:

Seven males, five females, one unsexed, Dire Daoua, Ethiopia, October 4 to December 19, 1911.

Two males, two females, Hawash River, Ethiopia, February 12, 1912.

One female, Gato River near Gardula, Ethiopia, April 15, 1912.

Sclater[25] recognizes three forms of this bird, but considers one of them (*somalicus*) only doubtfully distinct. The nominate form and the more southern *cabanisi* are very distinct, the latter lacking the white wing bars present in the former. Sclater writes that *somalicus* is doubtfully distinguishable from typical *minor*, but in this he is mistaken. If *somalicus* is not valid it is a synonym of *cabanisi* and not of *minor*. In the original description[26] Erlanger states that *somalicus* agrees in color with *cabanisi* (that is, has no white wing bars) but is smaller in size. In fact, Zedlitz[27] vaguely suggests that *somalicus* agrees more with the description of typical *cabanisi* than do specimens of the latter race from Kenya Colony and Tanganyika Territory. Van Someren[28] writes that from the measurements given by Reichenow for typical *cabanisi*, it would seem that Kenya and Uganda birds are larger than those of the White Nile.

Zedlitz[27] notes that five birds collected by Erlanger in Gallaland and Gurraland are more or less intermediate between *minor* and

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[23] Journ. f. Ornith., 1923, Sonderheft, pp. 114–116.

[24] Nov. Zool., vol. 29, 1922, p. 83.

[25] Syst. Avium Ethiop., 1924, pp. 236–237.

[26] Journ. f. Ornith., 1905, p. 461.

[27] Idem, 1915, pp. 34–36.

[28] Nov. Zool., vol. 29, 1922, p. 83.

somalicus and that the latter occasionally has white spots on the primaries (usually, when present, only on a few of them). Van Someren[28] has recorded a male of *cabanisi* with a white bar on the fourth primary of the right wing, "* * * indicating close relationship to *R. minor*," so it is not surprising to find this character appearing to a rather greater extent in *somalicus*, the form geographically next to both extremes (*minor* and *cabanisi*). The specimen from Gato River is more or less intermediate as far as the white wing bar is concerned. It has a white spot on the inner web only of primaries 2–7 inclusive (counting from the outside) and the white areas are less than half as broad as in northern, typical *minor*. However, it is large, having a wing length of 94 millimeters. Zedlitz gives the wing length of *minor* as around 95 millimeters, and of *somalicus* (female) as 80–87 millimeters, so in size it agrees with *minor* and it is to that form that it is here referred.

As I have shown elsewhere[29] the group Sclater refers to as *cabanisi* is really an aggregate of two races—a smaller, more northern form, *cabanisi*, and a larger, southern one, *extimus*.

The races of this species are as follows:

1. *R. m. minor*.—Characterized by well-developed white wing bands and small size (wing, male, 95–98 millimeters, female, 90–99 millimeters). This form occurs from the plateau country of French and British Somaliland southwest through the Hawash drainage basin across Arussi-Gallaland to southern Shoa as far as the Gato River. It does not appear to have been recorded from the Kaffa and Omo districts, or from the drainage area of the Nile and its eastern tributaries.

2. *R. m. somalicus*.—Intermediate in character between *minor* and *cabanisi*, sometimes with, sometimes without, the white wing bands; wing length, male, 92–98 millimeters, female, 80–87 millimeters.[30] Known from southern Italian Somaliland (Sarigo in the Garre-Livin district, and the country between Bardera and the coast) and from adjacent parts of Jubaland south along the coast as far as the mouth of the Tana River. During the nonbreeding season (February to May) it appears to wander about in central and north-central Kenya Colony. Thus Lönnberg[31] records specimens from the area between Chanler Falls and the Lekiundu and Luazomela Rivers. His birds were taken in February, while Mearns collected a series of six specimens there in August, and these are *cabanisi*. Zedlitz[30] suggests that the birds of the northern half of Kenya Col-

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[28] Nov. Zool., vol. 29, 1922, p. 83.

[29] Proc. N. Eng. Zool. Club, vol. 11, 1929, p. 29.

[30] According to Zedlitz, Journ. f. Ornith., 1915, p. 35.

[31] Kungl. Sv. Vet. Akad. Handlgr., vol. 47, No. 5, 1911, p. 77.

lony are *somalicus*, but I do not agree with him, as he probably was confusing breeding and nonbreeding individuals.

3. *R. m. cabanisi.*—No white wing band; wings, male, 97.5–102.5 millimeters, female, 88–98.5 millimeters. This bird at first sight is very distinct from *minor* and might be considered specifically so were it not for the variable nature of the connecting form, *somalicus*, Zedlitz,[30] Van Someren,[32] and others have suggested that the birds of southern Kenya Colony were different from typical *cabanisi*, but hesitated to separate them in the absence of topotypical material. *R. m. cabanisi* was described from the White Nile between 3° and 4° north latitude, a region where the bird is rare. The type in the Turin Museum is not available to me, and the only clue as to its size is in the original description, where it is said that, "magnitudine, forma, pictura, *Irrisori minori* Rüpp. valde affinis, sed absque remigum maculis albis." It seems, therefore, that the type was rather small, agreeing with the birds of the northern half of Kenya Colony, and not with the more southern ones (*extimus*). The range of *cabanisi* is as follows: The upper White Nile from Mongalla south to Uganda and east through the northern half of Kenya Colony south to about the equator.

4. *R. m. extimus.*—Similar to *cabanisi* but larger (wings 106–112 millimeters in *extimus* as against 97.5–102 millimeters in *cabanisi*). The range is as follows: Northern Tanganyika Territory and southern Kenya Colony (Taveta and Teita districts to southern Ukamba and south Kavirondo). The southern limits as given by Sclater for *cabanisi* (which includes *extimus*) are Teita and the Pagani River, but the range of *extimus* extends as far south as Dodoma on the central railway line.

This bird is a characteristic inhabitant of the Acacia savannas of northeastern Africa but does not occur in the lowlands, where it is replaced by *somalicus*. Erlanger found it breeding in the country between Zeila and Jeldessa, where on March 1, he found a nest with six young. The breeding season lasts from February to May.

In the northern part of its range the molting season is earlier in the west than in the east. Thus, most of the birds collected at Dire Daoua in December are in molt, but are nearly finished, only the outermost pair or two of the remiges being old, while farther toward the Somaliland border the molt appears to linger until the end of March or early April. More material is needed, however, to establish this point with certainty.

It takes at least two years for the birds to become fully adult in plumage (that is, with bluish-black underparts instead of dull black as in year old birds).

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[30] Journ. f. Ornith., 1915, p. 35.

[32] Nov. Zool., vol. 29, 1922, p. 83.

Rhinopomastus minor minor

Locality	Males			Females		
	Wing	Tail	Culmen	Wing	Tail	Culmen
Ethiopia:						
Dire Daoua	98. 0	114. 5	33. 0	90. 5	103. 0	29. 5
Do	96. 0	110. 0	34. 5	99. 0	117. 0	32. 5
Do	93. 0	105. 0	36. 0			
Do	97. 5	111. 5	35. 0			
Do	96. 0	111. 0	35. 0			
Do	94. 5	104. 0	33. 0			
Hawash River	98. 0	115. 5	35. 0			
Do	97. 0	113. 5	38. 0			

Rhinopomastus minor cabanisi

Locality	Males			Females		
	Wing	Tail	Culmen	Wing	Tail	Culmen
Kenya Colony:						
Lekiundu River	101. 0	110+	38. 0	90	107	30. 0
Do	102. 5	117	35. 0			
Do	101. 0	120	36. 5			
Thika River	101. 5	121	32. 5			
Tana River	101. 0	125. 5	28. 5			
Kisumu	[1] 97. 0	114. 0	29. 0			
Do	105. 5	123. 5	30. 0			
Guaso Nyiro	102. 5	119. 0	36. 5	91. 5	109. 0	29. 0
Meru River	97. 5	111. 0	36. 0			
Latitude 0° 10′ N., longitude 37° 20′ E.				98. 5	115	30. 0
Latitude 0° 10′ N., longitude 38° 45′ E.				88. 0	102	28. 5
Tanganyika Territory, Dodoma	108. 0	133. 5	36. 0	106. 5	123	

[1] Immature.

RHINOPOMASTUS MINOR CABANISI (Defilippi)

Irrisor cabanisi Defilippi, Rev. Mag. Zool., 1853, p. 289: White Nile, 3° and 4° N. latitude.

Specimens collected:

Three males, one female, Lekiundu River, Kenya Colony, August 4–8, 1912.

One male, Tana River, camp No. 6, Kenya Colony, August 21, 1912.

One male, Bowlder Hill, Thika River, Kenya Colony, August 28, 1912.

As already mentioned, this form ranges south to central Tanganyika Territory. It is unfortunate that the type locality is at the extreme northern limit of its range, especially since it is a scarce bird there. (See Sclater and Mackworth-Praed.[33])

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[33] Ibis, 1919, p. 664.

At first sight this bird would seem to be specifically distinct from *minor* as the latter has a broad white wing bar and the former has none, but Van Someren[34] has recorded a specimen of *cabanisi* with the beginning of such a bar. Furthermore, *somalicus* is intermediate in this respect and serves to connect them.

Besides the actual specimens obtained, this bird was recorded as follows: Northern Guaso Nyiro River, July 31 to August 3, 4 seen; Lekiundu River, August 4–8, 22 birds; Tharaka district, August 13, 2 seen; Tana River, August 20–23, 12 noted; west of Ithanga Hills, August 28, 20 seen; Athi River, August 29, 6 birds observed.

Family BUCEROTIDAE

BYCANISTES CRISTATUS CRISTATUS (Rüppell)

Buceros cristatus Rüppell, N. Wirbelth., Vög., p. 3, pl. 1, 1835: Lake Tsana, Ethiopia.

Specimens collected:

One male, Arussi plateau, 8,500 feet, Ethiopia, February 23, 1912.
One male, Cofali, Ethiopia, March 2, 1912.
One male, Malke, Ethiopia, March 3, 1912.
Two females, Aletta, Ethiopia, March 7, 1912.
One male, Ethiopia, March, 1912.

The silvery-cheeked hornbill has two geographic races, as follows:

1. *B. c. cristatus.*—Ethiopia and the extreme northern parts of Kenya Colony. Although the type locality is Lake Tsana, Sclater[35] gives southern Ethiopia as the northern limit.

2. *B. c. brevis.*—Central and southern Kenya Colony south through Tanganyika Territory to Nyasaland and Mashonaland. This form differs from the typical one in having a smaller wing length. The two forms meet and intergrade in north-central Kenya Colony. I have seen an intermediate specimen from Nyeri, but birds from Meru and Chuka are true *brevis.*

Grote[36] has suggested that *cristatus* and *subcylindricus* are representative members of one form-circle, a statement that is largely true, but the two forms seem best considered as not conspecific. Grote did not go to the extent of using trinomials, but his map certainly conveys the idea of the geographical representativeness which subspecies ought to have.

The specimen without locality or definite date is somewhat intermediate between *cristatus* and *brevis*, but the wings are in molt and the measurements therefore, not especially significant. The size of the typical form may be suggested by the following data of the present series:

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[34] Nov. Zool., vol. 29, 1922, p. 83.
[35] Syst. Avium Ethiop., 1924, p. 226.
[36] Mitt. Zool. Mus. Berlin, 1927, p. 205.

Males: Wing 380–385, tail 288–320, culmen from the posterior margin of the casque 197–205, and casque 183–202 millimeters. Females: Wing 345–353, tail 266–270, culmen (as in male) 161–164, and casque 93–94 millimeters.

The southern race, *brevis*, has the wing length varying from 345–360 in the males, from 321–333 millimeters in the females, while two intermediate males have wings of 370 and 377 millimeters, respectively.

Several specimens of the present series are molting the remiges and rectrices, but in no specimen is the molt in an advanced stage. However, it indicates that the wing molt begins at the carpal joint and that if there is a second, more distal ecdysial center in this species, as in some other hornbills, it does not appear until after the molt has begun at the first one. The tail molt is irregular, the single rectrix shed and replaced in each of the molting birds being different. One of the birds is molting the upper tail coverts.

Mearns noted that the male collected on February 23, in the Arussi Plateau, was probably breeding in a grove on the open plain at 8,500 feet (2,550 meters), and that several groves were occupied by birds of this species. Neumann [37] writes that this species occurs in highlands between the altitudinal limits of 1,800 and 2,500 meters (roughly 6,000 and 8,300 feet) and prefers the forested country. In the lowlands and above 2,700 meters (about 9,000 feet) the species is absent. Erlanger [38] writes that a male collected on March 26 near Gara-Mulata had the gonads much enlarged, and that the breeding season therefore appeared to be at that season, a statement which indicates that Mearns may well have been correct in his surmise that the Arussi bird was nesting in late February. Farther south, according to Sir Harry Johnston's observations on Mount Kilimanjaro, the species (subspecies *brevis*) breeds in August and September. However, Sjöstedt [39] took a young bird from the nest on Kilimanjaro on December 17, so the season is probably a prolonged one there.

LOPHOCEROS NASUTUS NASUTUS (Linnaeus)

Buceros nasutus LINNAEUS, Syst. Nat., ed. 12, vol. 1, p. 154, 1766: Senegal.

Specimens collected:

One female adult, Duletcha, Ethiopia, January 24, 1912.

Two male adults, one female adult, Sadi Malka, Ethiopia, February 3, 1912.

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[37] Journ. f. Ornith., 1905, p. 187.

[38] Idem, p. 444.

[39] Kilimanjaro-Meru Exp., 1910, vol. 1, p. 93.

One male adult, one female adult, Hawash River, Ethiopia, February 10, 1912.

Nine male adults, one male (?) young, three female adults, one female (?) young, Gato River near Gardula, Ethiopia, April 1 to May 15, 1912.

One male adult, Tharaka District, Kenya Colony, August 13, 1912.

Two male adults, Tana River, camp 5, Kenya Colony, August 20, 1912.

Soft parts:

Adult male.—Iris, dark brown or reddish brown; feet, blackish anteriorly, paler posteriorly; claws, black; bill, black with a pale yellow or whitish area on the baso-lateral part of the maxilla, the mandible with or without oblique, narrow whitish lines on the basal portion; naked skin on sides of throat slate gray or plumbeous, the bare area under the eye greenish.

Adult female.—Iris, reddish brown; bare area below eye, green; naked skin at sides of throat, yellowish green; feet and claws, blackish; distal half of bill, red or brownish red, basal half of maxilla, except edge of commissure, yellow or whitish, basal half of mandible, black.

Immature female.—Iris, brown; naked skin around eye and rami of jaws, fleshy yellowish brown; feet, plumbeous black anteriorly, yellowish white posteriorly; bill, all plumbeous black.

The gray hornbill inhabits all of Africa south of the Sahara except forested regions, and occurs in western and southwestern Arabia as well. Throughout this enormous range it breaks up into three valid subspecies, as follows:

1. *L. n. nasutus.*—Senegal, through the upper Guinean savanna districts to the Chad region of Northern Nigeria, through the Anglo-Egyptian Sudan to Ethiopia, Eritrea, Somaliland, Kenya Colony (to the central portion at least), and Uganda. In northern Ethiopia, Eritrea, and the Danakil coastlands this form intergrades with the next one, but on the whole, the northeast African birds are nearer to *nasutus* than to *forskalii.*

2. *L. n. forskalii.*—Western and southwestern Arabia. According to Sclater[40] this form extends into northern Ethiopia, intergrading with typical *nasutus* in the Nile Valley. Zedlitz[41] refers specimens from Cheren, Ela Bered, Mai Atal, and Barca to *forskalii*, and states the range of this form in continental Africa to comprise the Barca drainage area and the Danakil and Eritrean coastlands east of the eastern Abyssinian escarpment. However, he gives the wing measurements of his four birds as 230, 230, 235 (males), and 223 milli-

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[40] Syst. Avium Ethiop., 1924, p. 226.

[41] Journ. f. Ornith., 1910, p. 764.

meters (female). At this rate, the male collected by Mearns at the Hawash River and one of the two from Sadi Malka, and, possibly, also the female from Duletcha might be considered as *forskalii.* The wing measurements of the typical form vary from 203–231 millimeters in the males, and from 202–211 millimeters in the females, while Sclater [42] writes that Arabian birds (typical *forskalii*) have wings averaging 250 millimeters in length. It is therefore apparent that Zedlitz's birds are much closer to *nasutus* than to the Arabian race. I know of no true *forskalii* from the African mainland.

3. *L. n. epirhinus.*—Southern Kenya Colony, south through the Taru Desert and the Kilimanjaro area through Tanganyika Territory, Mozambique, and Nyasaland to Swaziland, Zululand, Rhodesia, Angola, and Bechuanaland to as far south as the Orange River.

Roberts [43] has described a form from Bagamoyo, Tanganyika Territory, under the name *maraisi*, said to differ from *epirhinus* and the other races of *nasutus* in being much smaller (wing ranging from 187 (female) to 202 (male); tail, 175 (female) to 180 (male); culmen, 68 (female) to 80 millimeters (male). He apparently had but one of each sex of his new form. Grant [44] put *maraisi* into the synonymy of *epirhinus* on the basis of a study of the range of size variation found in this species in other parts of Africa, as he had no Tanganyikan material for study. Roberts [45] later refuted Grant's conclusions and definitely stated that *maraisi* differs from *epirhinus* not only in being smaller, but also in lacking a casque, thereby agreeing with typical *nasutus.* It should be borne in mind that Roberts did not collect the type and cotype of *maraisi* himself but says that they are fully adult. In 1925, at Taveta, southern Kenya Colony, I collected a male specimen of *epirhinus* which has all the appearances of being fully adult, which lacks the casque, and agrees with the measurements of *maraisi* (wing 196, tail 180, and culmen 63 millimeters). Yet the bird, although seemingly adult, proved on dissection to be immature. It seems to me that *maraisi* is a synonym of *epirhinus* based on immature specimens. It would be fairly easy for Mr. Roberts to definitely settle this by examining the maxillary and mandibular tomia of his birds, as the serrations do not appear until the bird is at least a year old. If the type and cotype of *maraisi* have smooth tomia, they are undoubtedly young birds. The sexual difference in bill coloration develops before the serrations on the tomia.

The differences between the three races are as follows: *forskalii* is similar to *nasutus* but larger, the wing averaging 250 millimeters as against 225 millimeters, while *epirhinus* agrees in size with *nasutus* but differs from both in having the casque well developed and produced anteriorly, ending with a rather pointed tip. This is true of the males only. According to Reichenow,[46] the females can be distinguished by the white terminal edges of the remiges which are found in *nasutus* and not in *epirhinus.* Lönnberg[47] writes that this last character is not constant and has therefore no taxonomic value. Nevertheless, if due allowance be made for wear, this character does hold fairly well, but a very worn female *nasutus* can not readily be told from a similarly abraded *epirhinus.* In fresh plumage *epirhinus* has the remiges tipped with light grayish or brownish white, but the tips are not as wide or as pure white as in *nasutus.* The difference is one of degree rather than a definite absence or presence of this character.

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[42] Ibis, 1917, p. 175.

[43] Ann. Transv. Mus., vol. 4, July, 1914, p. 170.

[44] Ibis, 1915, p. 271.

[45] Ann. Transv. Mus., vol. 5, 1917, pp. 248–250.

In central Kenya Colony (between the equator and the vicinity of Nairobi) overlapping and intergrading take place, rendering it difficult to draw the geographical limits of the two forms. Thus, Van Someren[48] records typical *nasutus* from Fort Hall, while Lönnberg[47] lists *epirhinus* from Nairobi. It appears that the latter race reaches its northern limit in the Kikuyu and Ukamba country, and that *nasutus*, like many Somaliland forms, occurs in the coastal strip almost to Mombasa, where it is replaced by *epirhinus.*

The gray hornbill inhabits a rather wider range of ecological habitats than most of the members of its genus. It is found in both open thornbush country, savannas, and wooded areas, but not in dense forest.

The material examined in the present study (37 specimens) illustrates the plumages and molts of this bird fairly well, and as these are not well known, they are given here.

Two young birds taken from the same nest on May 15 at Gato River, near Gardula, are about half grown and have the remiges and rectrices well enough along in development to show the juvenal plumage. The only difference between it and the adult feathering is, curiously enough, a slightly paler gray on the sides and flanks in the former. The white tips of the rectrices (except the median ones, which lack the tips) have a small, median, terminal, dark gray spot in them which is not present in any of the adults examined, and may be characteristic of the first plumage. However, its apparent absence in adults may possibly be due to wear.

The juvenal plumage is not replaced by an early postjuvenal molt, but is worn for about a year. This statement is based wholly on the degree of abrasion of the plumage of full-grown birds with smooth tomia, as it is not possible to tell the age of the bird after it has attained its full size except by the bill. With wear, the light edges of the upper wing coverts gradually disappear and the feathers of the chin and throat fade laterally, leaving the median portion darker, thereby causing the effect of dark shaft stripes. The postjuvenal molt appears to be complete; that is, all the specimens that are molting remiges or rectrices are also molting body feathers, and none with worn wing and tail feathers are clad in fresh body plumage. The next plumage is the first adult plumage, which is like every subsequent one, the only seasonal differences being due to abrasion. Adults appear to breed in fairly fresh plumage, not in worn plumage as in so many other birds. Here again, as in *Lophoceros deckeni* the explanation seems to be that the postnuptial molt is a prolonged one, and that the next breeding season begins before the plumage has had much chance to become abraded.

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[46] Vög. Afr., vol. 2, p. 259.

[47] Kungl. Sv. Vet. Akad. Handlgr., 1911, p. 72.

[48] Nov. Zool., vol. 19, 1922, p. 76.

The wing molt in this species appears to be somewhat irregular, and the tail molt to begin with the middle rectrices and proceed outward.

The size variations of the nominate form may be judged from the following figures:

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Sadi Malka	♂	236	216.0	97.0	40.0
Do	♂	224	204.0	86.0	42.0
Hawash River	♂	237	217.0	98.0	41.0
Gato River near Gardula	♂	227	190.0	101.0	38.0
Do	♂	230	206.0	90.0	37.5
Do	♂	227	195.0	96.0	43.0
Do	♂	212	186.0	85.0	37.0
Do	♂	223	196.0	92.5	37.5
Do	♂	225	192.0	100.0	40.0
Do	♂	218	195.0	92.0	37.0
Do	♂	228	214.0	91.5	36.0
Do	♂	203	195.0	80.0	34.0
Sudan, Magangani, Blue Nile	♂	217	208.0	105.0	38.0
Kenya Colony:					
Tharaka district	♂	231	205.0	88.5	42.0
Tana River	♂	227	203.0	85.0	39.5
Do	♂	220	205.0	77.0	39.0
West of Kazita River	♂	234	207.0	96.0	39.0
Do	♂	229	209.0	97.0	40.0
Gambia, Tento	♂	221	202.0	98.0	36.0
Ethiopia:					
Duletcha	♀	217	197.0	81.0	38.0
Sadi Malka	♀	210	187.0	75.0	33.0
Hawash River	♀	210	197.0	81.0	36.0
Gato River near Gardula	♀	206	177.0	77.0	36.0
Do	♀	202	192.0	76.0	35.0
Do	♀	211	190.5	82.0	34.0
Kenya Colony, Tana River	♀	202	187.0	80.0	35.0

Besides the specimens collected Mearns noted this species as follows: Gato River, March 29 to May 17, 100 seen; Bodessa and Sagon River, May 18 to June 6, 30 birds observed.

The nestlings taken on May 15 at Gato River indicate that the breeding season must begin in late March, if not sooner. It appears that this hornbill may lay more than two eggs, as Böhm [49] found four fledged young of *L. n. epirhinus*, at Luagula on September 26, which his black boy is said to have taken from one nest.

Mearns noted the contents of the stomachs of three of the birds in the present series. Two males (one immature and one adult) from the Tana River had been feeding on the fruits of a large tree (fig ?), the fruits about the size of a large pea; the other, a male from the Gato River, had insects and fruit pulp in its stomach.

LOPHOCEROS ERYTHRORHYNCHUS ERYTHRORHYNCHUS (Temminck)

Buceros erythrorhynchus TEMMINCK, Pl. Col., livr. 36, sp. 19, 1823: Senegal.

Specimens collected:

Six males, thirteen females, Dire Daoua, Ethiopia, November 27 to December 20, 1911.

One male, Tolo, Ethiopia, December 16, 1911.

One male, one female, Duletcha, Ethiopia, January 24, 1912.

One male, one female, Sadi Malka, Ethiopia, February 2–3, 1912.

Two males, one female, Sagon River, Ethiopia, May 19 to June 6, 1912.

One male, five females, Tertale, Ethiopia, June 7–11, 1912.

One male, Turturo, Ethiopia, June 15, 1912.

One male, Wobok, Ethiopia, June 19, 1912.

One male, one female, Yebo, Ethiopia, June 21, 1912.

One female, Endoto Mountains, Kenya Colony, July 12, 1912.

Two females, Endoto Mountains, south, Kenya Colony, July 23, 1912.

One male, one female, Er-re-re Villages, Kenya Colony, July 25, 1912.

One male, Malele, Kenya Colony, July 27, 1912.

One male, 25 miles north of Northern Guaso Nyiro River, Kenya Colony, July 30, 1912.

One [female], Lekiundu River, Kenya Colony, August 5, 1912.

One male, one female, Tana River at mouth of Thika River, Kenya Colony, August 23–24, 1912.

Soft parts: Male—bill red, lower half of mandible black. Female—bill vinaceous red all around, dusky at the tip, and yellowish at the base. One specimen has a blackish bar along the lower border of the mandible.

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[49] Cf. Reichenow, Vög. Afr., vol. 2, p. 260.

The red-billed hornbill inhabits most of Africa south of the Sahara, omitting the forested areas of the western and west-central parts of the continent. It is said to break up into three races [50] and the 64 specimens examined by me in the course of the present study support this contention as far as the material represents the range of the bird.

1. *L. e. erythrorhynchus.*—From Senegal through the upper Guinean savanna region to the Lake Chad area, the Anglo-Egyptian Sudan to the Nile Valley, Ethiopia, Eritrea, Somaliland, Kenya Colony, Uganda, and Tanganyika Territory. It may be that, as Van Someren [51] suggests, the northeast African birds should be separated subspecifically from the typical Senegalese ones on account of the narrower, less curved bill which the latter have. In this case, the name *leucopareus* Hemprich and Ehrenberg would be available for the eastern birds. However, as I have seen no Senegalese material, and as Van Someren did not seem sure enough of his convictions to carry them out in the paper referred to, I do not attempt to split this race into an eastern and western form.

2. *L. e. rufirostris.*—Southern Angola, Ovampoland, and northern Damaraland, east through the Katanga and Rhodesia to Nyasaland and Mozambique, south through Bechuanaland to the Transvaal where its range is coincident with that of the thornbush country. This is the form called *caffer* in Sclater's list. Gyldenstolpe [52] has shown that *rufirostris* is the correct name of this race and must stand, with *caffer* as a synonym. Sundevall's use of the words "var. caffer" is to be understood as a geographic, not a nomenclatural one, as he explicitly calls the bird "*rufirostris* n. sp." after writing these words. This race differs from the typical one in that the bar on the outer rectrices is restricted to the outer webs in *erythrorhynchus* and extends across both webs in *rufirostris*. Also the whitish superciliary streak is better developed in the former than in the latter.

3. *L. e. damarensis.*—Only known from Damaraland proper. This form I have not seen, but it appears to be much whiter, especially on the top of the head. In his revision of the races of this species [53] C. Grant considered *damarensis* a synonym of *caffer* (now *rufirostris*) on the assumption that Shelley's type and cotype were albinistic examples. Finch-Davies [54] refuted this conclusion and showed *damarensis* to be a valid geographical entity. He writes that the form found in the north of Damaraland is, "* * * most certainly *L. erythrorhynchus caffer*, but as one goes south it gradually merges

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[50] Sclater, Syst. Avium Ethiop., 1924, p. 227.

[51] Nov. Zool., vol. 29, 1922, p. 76.

[52] Arkiv för Zool., vol. 19 A, no. 1, 1926, p. 84.

[53] Ibis, 1915, p. 273.

[54] Idem, 1917, p. 273.

into *damarensis;* birds collected at Akanjande appear somewhat intermediate * * ."

Sharpe's form *medianus*[55] is merely a small female of the typical race. These hornbills vary greatly in size, as may be seen from the table of measurements of the Mearns-Frick series. Lönnberg[56] has called attention to the fact that the bill is shorter in birds living in regions of hard soil than in specimens from places where the ground is softer, and attributes this difference solely to wear. His figures (unfortunately mislabelled *L. melanoleucus*) may be matched by specimens from the present series. While there may be some truth in his contentions, the fact that both long and short billed birds from the same locality are to be found in the present series indicates that individual variation and, possibly, age, must be taken into consideration as well as wear. While it is true that hornbills use their beaks for digging, this habit is not very extensive or very frequently indulged in. As in most hornbills, the tail length is more variable than that of the wing or the bill, and in this case it may well be that the ease and rapidity with which the long rectrices are frayed and abraded are important factors. The color variations are not particularly noticeable, the most variable feathers being the outer remiges and the rectrices. The white marks on the primaries vary from rather narrow transverse bars to almost circular spots. In about half the specimens the next to the outermost primary has no white on the outer web, while in the other 50 percent some (even if only a very little) white is present on the edge of the outer web. The outer three pairs of rectrices vary enormously with regard to the disposition of white and dark. The five accompanying figures are merely sample cases picked at random and could be multiplied very easily. Neither sex nor age seems to be in any way correlated with this variation.

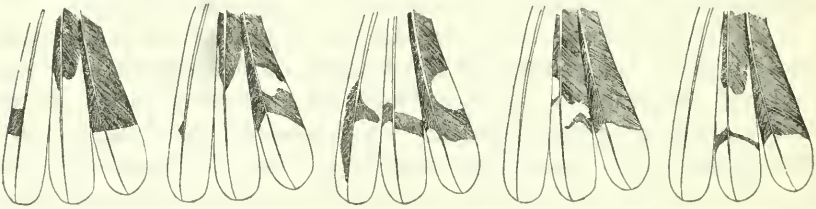

FIGURE 13.—THE THREE OUTERMOST RECTRICES (RIGHT SIDE OF TAIL) OF LOPHOCEROS ERYTHRORHYNCHUS ERYTHRORHYNCHUS TO SHOW VARIATION

The size variations are presented in tabular form below. The series is large enough to give a fair idea of the range of dimensional variation in this bird.

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[55] Proc. Zool. Soc. Lond., 1895, p. 498: Dabulli, western Somaliland.

[56] Kungl. Sv. Vet. Akad. Handlgr., 1911, pp. 72–73.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Dire Daoua	♂ adult	156.5	172.0	64.0	35.5
Do	do	186.0	218.0	70.5	41.0
Do	do	179.0	203.0	77.0	43.0
Do	do	182.5	212.5	80.0	42.0
Do	do	180.0	194.0	81.0	37.0
Do	do	184.0	195.0	86.5	39.0
Tollo	do	187.0	206.5	80.0	39.0
Duletcha	do	183.0	206.0	82.5	39.0
Sadi Malka	do	183.0	208.0	89.5	39.0
Sagon River	do	186.5	203.0	88.5	43.0
Do	do	181.0	202.0	66.0	39.5
Tertale	do	188.0	215.0	84.0	43.0
Turturo	do	184.0	204.5	70.0	43.5
Wobok	do	184.0	204.0	68.0	45.0
Yebo	do	182.5	212.0	87.0	39.5
Kenya Colony:					
Er-re-re	do	185.5	212.5	88.0	40.5
Malele	do	184.0	214.0	85.5	42.5
25 miles north of Northern Guaso Nyiro.	do	181.0	188.0	81.5	41.5
Tana River	do	173.0	198.0	84.0	40.5
Ethiopia:					
Dire Daoua	♀ adult	173.0	197.0	64.5	36.0
Do	do	165.5	184.5	66.0	36.0
Do	do	167.0	179.0	62.0	35.5
Do	do	170.0	181.0	65.5	38.0
Do	do	162.0	175.0	67.0	37.0
Do	do	164.0	180.0	65.5	37.0
Do	do	168.5	173.0	63.5	34.0
Do	do	169.5	179.0	65.0	35.0
Do	do	185.5	204.0	86.0	39.0
Do	do	183.0	209.0	83.0	43.5
Do	do	182.0	199.5	77.0	39.5
Do	do	164.5	180.0	69.5	35.0
Do	do	164.0	177.0	68.5	36.0
Duletcha	do	166.0	185.0	67.0	36.0
Sadi Malka	do	176.0	183.0	67.0	37.5
Sagon River	do	168.5	188.5	72.0	37.0
Tertale	do	167.0	173.0	60.5	37.0
Do	do	167.5	193.0	59.0	37.0
Do	do	162.5	190.0	57.0	38.0
Do	do	166.0	184.5	66.0	36.0
Do	do	159.0	180.0	57.5	37.0
Yebo	do	169.5	188.0	63.5	38.5
Kenya Colony:					
Endoto Mountains	do	164.5	179.0	55.0	36.5
Do	do	165.5	185.0	69.0	38.0
Do	do	172.0	195.0	59.0	37.0
Er-re-re	do	170.0	193.0	65.0	39.0
Lekiundu River	do	169.0	182.0	57.5	36.5
Tana River	do	164.0	189.0	63.0	35.5

Throughout its range this form is more or less of a lowland species especially when compared with the yellow-billed hornbill. Erlanger[57] found it to be very common in the arid Acacia savannas of

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[57] Journ. f. Ornith., 1905, pp. 442–443.

Somaliland, Ennia and Arussi Gallaland. Although *L. flavirostris* has the same geographic range, the two species are ecologically quite distinct, the latter favoring the more luxuriant vegetation along the banks of the periodic streams rather than the real thorn country. Blanford[58] writes that *erythrorhynchus* inhabits a lower zone of elevation in general than *flavirostris*, although the two do occur together in many places. He found the red-billed species on the Anseba River, in the Lebka Valley, in Samhar, and near Mayen, but never in the highlands. Zedlitz,[59] however, says that this species is very abundant at elevations of 2,000 meters (6,600 feet) and higher.

The breeding season is rather prolonged. Mearns shot a mated pair of these birds on the Sagon River on June 6, while Erlanger[57] and Von Heuglin and others found the breeding season in Ethiopia to be from February to April. In Eritrea, according to Zedlitz, the birds breed in summer (June to July), an observation in keeping with the dates given for Darfur by Lynes[60] and hinted at for Ethiopia by Blanford.

In northern Kenya Colony the breeding season appears to be somewhat earlier as the birds collected at Er-re-re are in fresh plumage, a sign of postbreeding condition, while others from Endoto Mountains and the Tana River, and from southern Ethiopia (Yebo) are in molt and may have been in breeding condition when shot.

The wing molt begins with the third or fourth primary. Later two other molt centers develop—the carpal joint, and the next to the outermost primary. The tail molt is centrifugal and, for a hornbill, very regular.

Mearns observed this hornbill as follows: Bodessa and Sagon River, May 18 to June 6, 85; Tertale, June 7–12, 150; El Ade, June 12–14, 225 seen; Mar Mora, June 15, 100; Turturo, June 15–17, 100; Anole, June 17, 10 seen; Wobok, June 18, 10 birds; near Saru, June 19, 1,000; Yebo, June 20, 500; Karsa Barecha, June 21, 1,000 birds; Chaffa villages, June 22–24, 560 birds; plains at base and south of Endoto Mountains, July 19–24, 1,100; Er-re-re, July 25, 2,400; Le-sedun, July 26, 200; Malele and country to the south for 45 miles, July 27–30, 350 seen; Northern Guaso Nyiro River, July 31 to August 3, 60 birds; Lekiundu River, August 4–8, 80; Meru, August 9, 20 seen; Tharaka district, August 12–13, 24 birds; Tana River, August 14, 30 seen; Tana River, at mouth of Thika River, August 23–26, 20 birds noted.

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[57] Journ. f. Ornith., 1905, pp. 442–443.

[58] Geol. and Zool. Abyss., 1870, p. 328.

[59] Journ. f. Ornith., 1910, p. 764.

[60] Ibis, 1925, p. 381.

LOPHOCEROS FLAVIROSTRIS FLAVIROSTRIS (Rüppell)

Buceros flavirostris RÜPPELL, N. Wirbelth., Vög., p. 6, pl. 2, 1835: Taranta Mountains, Ethiopia.

Specimens collected:

One male and two females, Tollo, Ethiopia, December 16, 1911.

Three males and two females, Sadi Malka, Ethiopia, January 30, to February 3, 1912.

One female, Hawash River, Ethiopia, February 10, 1912.

One female, Tertale, Ethiopia, June 9, 1912.

One male and one female, Hor, Kenya Colony, June 28–29, 1912.

One female, 18 miles southwest of Hor, Kenya Colony, July 1, 1912.

One male, immature, Lake Rudolf, southeast, Kenya Colony, July 10, 1912.

One female, Nyiro Mountain., Indunumara Mountains, Kenya Colony, July 14, 1912.

One female, immature, Spring in Indunumara Mountains, Kenya Colony, July 17, 1912.

One male and two females, Endoto Mountains, south, Kenya Colony, July 22–24, 1912.

One female, Le-se-dun, Kenya Colony, July 26, 1912.

Soft parts: iris, yellow; bill, yellow with a reddish-brown commissural band; feet, black anteriorly, whitish posteriorly; bare skin on throat black in females, flesh color in males. The amount of reddish brown on the bill is variable and purely individual in its fluctuations.

Sclater[61] recognizes four races of the yellow-beaked hornbill, but after a study of the literature and of a series of some 25 birds, I have come to the conclusion that one of these, *somaliensis*, is not valid and is to be considered the same as the typical form. The three races that I admit are as follows:

1. *L. f. flavirostris.*—Eritrea, Danakil-land, Ethiopia, and Somaliland, south through Jubaland and eastern Kenya Colony to the Kilimanjaro district.

The form *somaliensis* was described by Reichenow[62] on the basis of slightly smaller size and the mandible being reddish in color. Zedlitz[63] and Erlanger[64] both either overlooked Reichenow's form or considered it the same as typical Ethiopian birds, but neither makes any mention of *somaliensis* either by name or by inference. Both, however, consider Somaliland birds the same as Ethiopian ones. Van Someren[65] writes that it seems to him that *somaliensis* (which he erroneously refers to as *somalicus*) is founded on a female of typical *flavirostris.* "Seven adult males from Somaliland show no red on the lower mandible, two females have the basal half and the tip reddish, but this is also found in east African birds. Two birds, differing only in the color of the lower mandible, otherwise alike, can hardly occupy the same locality." I have examined an adult female from British Somaliland (Lort Philips collection) and can find no difference either in size or in color between it and typical *flavirostris.*

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[61] Syst. Avium Ethiop., 1924, pp. 227–228.

[62] Journ. f. Ornith., 1894, p. 96.

[63] Idem, 1915, p. 25.

[64] Idem, 1905, p. 444.

The typical race of this hornbill may easily be identified by reason of the fact that the breast feathers are white with black shaft stripes, while in the other two forms these feathers are laterally edged with black and have no shaft stripes.

2. *L. f. leucomelas.*—From the Orange River and Natal northward through Damaraland, Bechuanaland, and Southern Rhodesia to the Zambesi Valley. I know of no definite records from southern Mozambique or from Nyasaland or Northern Rhodesia.

This form and the next are very similar but the white spots on primaries 3 to 7 (counting from the outside) are restricted to the outer webs in *leucomelas* while in *elegans* there are spots on both webs in these feathers. *L. f. leucomelas* is the only one of the three races of the yellow-beaked hornbill in which the basal black area on the third (from the outside) pair of rectrices is not at all interrupted by white. It is most widely interrupted in the typical form, less so in *elegans*, never in *leucomelas.*

3. *L. f. elegans.*—Angola, Benguella, and Loanda. I have seen but one specimen of this form, marked "South Africa." It was originally in the collection of E. L. Layard and is otherwise without data, and I assume that the locality is wrong as South African specimens are all true *leucomelas.*

It is interesting to note in passing that the variations in the wing spots and the distribution of black and white in the rectrices have a geographical significance in this hornbill whereas in *Lophoceros erythrorhynchus* the highly diversified variations in these characters are purely individual. Have we here one species (*erythrorhynchus*) that is in an early stage of racial differentiation and another in which the process is complete? If so, it is perfectly obvious that natural selection has nothing to do with the formation of races or, at least, the elimination of certain variations, as these characters can not possibly be of any benefit or detriment to the birds.

The size variations of the present series may be appreciated from the following table:

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[65] Nov. Zool., vol. 29, 1922, p. 75.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Tollo	♂ adult	203. 0	220	93. 5	43. 0
Sadi Malka	do	204. 5	235	93. 5	44. 0
Do	do	199. 0	230	94. 0	45. 0
Do	do	195. 0	-------	96. 0	46. 5
Kenya Colony:					
Hor	do	203. 0	217	95. 0	47. 0
Endoto Mountains, south	do	199. 5	229	91. 0	44. 0
Ethiopia:					
Tollo	♀ adult	178. 0	197	78. 0	40. 0
Do	do	186. 0	188	72. 0	40. 0
Sadi Malka	do	178. 0	193	68. 0	38. 5
Do	do	189. 0	207	82. 0	44. 0
Hawash River	do	182. 0	194	77. 0	41. 0
Tertale	do	188. 0	212	83. 0	44. 0
Kenya Colony:					
Hor	do	192. 5	211	81. 5	42. 5
Hor, 18 miles south	do	183. 0	186	88. 0	45. 0
Indunumara Mountains	do	190. 0	205	82. 5	46. 0
Endoto Mountains	do	185. 0	199	80. 0	41. 0
Do	do	183. 0	202	82. 5	42. 0
Le-se-dun	do	184. 5	196	66. 0	38. 0

Von Heuglin found this bird in the hot valleys of Schoholand, but not in the low coastal area. Blanford[66] noted that in January and February it, "* * * was abundant in the pass leading to the highlands from about 2,500 to 5,000 feet above the sea. It was usually in small flocks. In May and June all had migrated to higher ground, and were met with, often singly, about Senafe at 7,000 and 8,000 feet." Jesse[67] did not meet with this bird higher up than Rayrayguddy, 1,800 meters (6,000 feet), in April. Erlanger found it widely distributed throughout Somaliland where it occurs in the sparsely wooded Acacia savannas of the lowlands but chiefly in the more luxuriant vegetation along the periodic river beds and more sheltered valleys. The fact that this bird tends to move from the lowlands to the highlands according to the rains is an additional argument against the subspecific distinctness of *somaliensis* and *flavirostris*. The highland birds descend into the lowlands during the rains and then retreat upwards as the fruits on which they feed ripen. It does seem, however, that some of the birds do breed in the lower parts of the country, and it may be that in Somaliland the situation is complicated by the presence at certain seasons of a resident group and a migrant group of birds.

In Kenya Colony the range of this species extends west farther in the north than in the south, where it narrows down to the Taru desert region. Lönnberg[68] procured specimens at Njoro and at

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[66] Geol. and Zool. Abyss., 1870, p. 327.

[67] See Finsch, Trans. Zool. Soc. Lond., vol. 7, 1872, p. 279.

[68] Kungl. Sv. Vet. Akad. Handlgr., vol. 47, no. 5, 1911, p. 72.

Guaso Nyiro below the Chanler Falls, while in the southern part of the country it is known from Ndi, Manugu, Tsavo, Bura, and Sagala.

Erlanger found it breeding early in April at Dagaje in the Gurra country, where he obtained three eggs on April 5.

The juvenal plumage is similar to that of the adult stage, but the breast feathers lack the black shaft streaks and there is no bare space on the lower throat. The young female collected on July 17 in the Indunumara Mountains is in fresh plumage (in fact the central pair of rectrices are still basally encased in their sheaths) and appears to have been out of the nest not more than a fortnight. The immature male taken on July 10 southeast of Lake Rudolf is in postjuvenal molt. In this molt only some of the body plumage is changed but the juvenal remiges and rectrices and their coverts are retained. The incoming pectoral feathers have black shaft streaks and the bird becomes indistinguishable from older ones after assuming the first winter plumage.

The birds collected from December through February are in worn plumage, while those taken in June and July are in fresh plumage, with one exception—the female collected at Le-se-dun on July 26 which is much abraded. Adult birds vary considerably with regard to the extent of the bare area on the lower throat. In some the naked skin forms a U with arms running cephalad along the sides of the throat, the basal part of the U being posterior. In others the basal part is nonexistent, that is, there are two lateral bare areas, while in others, the basal part is interrupted by a thin line of feathers on the midline of the throat.

Mearns observed this hornbill as follows: Tertale, June 7–12, 22 seen; El Ade, June 12–14, 10 birds; Mar Mora, June 15, 10; Turturo, June 15–17, 10 noted; Anole, June 17, 10; Wobok, June 18, 10 birds; near Saru, June 19, 10 seen; Yebo, June 20, 10 seen; Karsa Barecha, June 21, 20 birds noted; Chaffa villages, June 22–25, 4 noted; Hor, June 26–30, 12 seen; southeast of Lake Rudolf, July 9–12, 12 birds; Indunumara Mountains, July 13–18, 25 seen; plains at base and south of Endoto Mountains, July 19–24, 500 noted; Er-re-re, July 25, 100; Le-se-dun, July 26, 100; Malele south to the Northern Guaso Nyiro River, July 27–31, 139 birds recorded.

LOPHOCEROS DECKENI (Cabanis)

Buceros (Rhynchoceros) deckeni CABANIS, in von d. Decken, Reisen, vol. 3, pt. 1, p. 37, pl. 6, 1869: East Africa.

Specimens collected:

One male and one female, Serri, Ethiopia, February 13, 1912.

Ten males and eight females, Gato River near Gardula, Ethiopia, April 1 to May 4, 1912.

One male and two females, Sagon River, Ethiopia, June 3–5, 1912.

One male and two females, Endoto Mountains, south, Kenya Colony, July 21–23, 1912.

One female and three young males, Tana River, camp 3, Kenya Colony, August 16–17, 1912.

One male, Tana River, above camp 3, Kenya Colony, August 17, 1912.

One young male, Tana River, below camp 4, Kenya Colony, August 17, 1912.

One male, one female, and one young male, Tana River, at mouth of Thika River, Kenya Colony, August 23–25, 1912.

One young male, Thika River at Boulder Hill, Kenya Colony, August 28, 1912.

Soft parts:

Adult male.—Bill orange red on basal two-thirds succeeded by white in the middle, reddish brown to brownish black on the commissural line and at the tip of both mandible and maxilla.

Immature male.—Bill brownish orange on basal half, then whitish, and dusky at tip and along commissure.

Adult female.—Bill, all black; naked sides of throat, flesh color and blue anteriorly, red posteriorly; feet, black anteriorly, flesh color (or white) posteriorly; iris, brown.

Von der Decken's hornbill is a denizen of the rather arid thornbush country of eastern Africa from central Tanganyika Territory (Iringa, Useguha, Mpapua, Morogoro, etc.) north through Kenya Colony to eastern Uganda, Jubaland, southern Somaliland, Arussi-Gallaland, and Shoa to the vicinity of Harrar. Owing to the long-continued confusion in the literature of this species and its near ally, *jacksoni*, it is rather difficult to demarcate the geographical limits of either very definitely.

Ogilvie-Grant [69] described *jacksoni* from the Turkwell region on the northern Kenya-Uganda border. In 1905 Erlanger [70] stated that *jacksoni* was the young of *deckeni* and Zedlitz [71] upheld this conclusion, and consequently extended the range of *deckeni* to Turkwell and Uganda. Claude Grant [72] pointed out that the two were really distinct, but closely related, species, and figured the heads of both sexes of each to show the differences in the bill, but unfortunately transposed the names on the figures so that the figures labeled *jacksoni* really represent *deckeni* and vice versa. Van Someren [73] writes that *jacksoni* is little more than a northern race of *deckeni*, but because of the geographical overlapping is forced to grant it specific rank. Sclater[74] limits *jacksoni* to "Northern Uganda and Kenya Colony between Lake Rudolf and Mt. Elgon." On the other hand, Rothschild[75] says that *jacksoni* occurs in the southern part of the range of *deckeni* and occurs alone in parts of Uganda. The truth of the matter is that both species occupy much the same range. I have examined specimens of both from as far north as central Ethiopia and as far south as central Tanganyika Territory.

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[69] Ibis, 1891, p. 127.

[70] Journ. f. Ornith., p. 441.

[71] Idem, 1915, p. 26.

[72] Ibis, 1915, pp. 274–276.

[73] Nov. Zool., vol. 29, 1922, p. 76.

Being so much alike, and occupying the same general area, geographically and ecologically, one wonders how two such species, apparently only recently separated phylogenetically, could have come about. It would be well worth while to investigate the breeding seasons of each to see if there might not be any physiological isolation to render them mutually more distant and to make the competition between them less keen.

The juvenal plumages of the two are very similar, and as the bill character is not yet well developed, the young birds are difficult to identify. On the whole, *deckeni* is very slightly lighter brown above, but I freely admit that there are specimens that I can not place with any great degree of certainty. The similarity between the two birds in juvenal plumage, coupled with the fact that *jacksoni* retains the white spots on the upper wing covers in adult plumage, while *deckeni* does not, but becomes uniformly black in those parts, suggests not only community of descent, but also that *jacksoni* is the more primitive of the two. It would then appear that, since *deckeni* is considerably more numerous than *jacksoni*, the newer species (if such it really be) is gradually crowding out the older one and replacing it more and more.

In the course of the present study I have examined a series of 49 specimens of *deckeni* from Ethiopia, Kenya Colony, and Tanganyika Territory. As may be seen from the following table, northern birds do not differ from southern ones, the overlapping is as great as the variation, and consequently races based on sizes are not possible. In the table only adult birds are listed.

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[74] Syst. Avium Ethiop., 1924, p. 228.

[75] Ann. Mag. Nat. Hist., ser. 9, vol. 14, 1924, p. 317.

Locality	Sex	Wing	Tail	Culmen
Ethiopia:				
Hawash River	♂	183. 5	218	85. 0
Serri	♂	193. 0	233	88. 0
Gato River	♂	189. 0	226	89. 5
Do	♂	180. 0	212	87. 0
Do	♂	180. 0	204	78. 5
Do	♂	186. 0	231	88. 5
Do	♂	184. 0	220	83. 0
Do	♂	181. 0	211	85. 0
Do	♂	183. 0	218	81. 0
Do	♂	178. 0	213	88. 0
Do	♂	183. 0	216	86. 0
Do	♂	185. 0	205	85. 0
Sagon River	♂	189. 5	223	91. 5
Kenya Colony:				
Endoto Mountains	♂	183. 0	224	84. 0
Tana River	♂	189. 0	212	92. 0
Do	♂	178. 0	208	81. 0
Do	♂	187. 5	220	87. 0
Loita Plains	♂	180. 5	214	76. 0
Maktau	♂	189. 5	233	90. 0
Kazita River	♂	166. 5	203	77. 0
Maru River	♂	198. 0	250	84. 0
0° 7′ N., 38° 20′ E	♂	182. 0	236	83. 5
0° 2′ N., 38° 20′ E	♂	174. 0	223	84. 0
Tanganyika Territory, Morogoro	♂	185. 0	227	82. 0
Ethiopia:				
Serri	♀	165. 0	190	70. 0
Gato River	♀	166. 0	191	66. 0
Do	♀	165. 0	187	69. 0
Do	♀	164. 0	176	63. 5
Do	♀	168. 0	192	71. 0
Do	♀	173. 0	183	73. 0
Do	♀	169. 0	191	67. 0
Do	♀	163. 0	188	71. 0
Do	♀	171. 5	200	74. 0
Sagon River	♀	161. 0	193	71. 5
Do	♀	173. 0	202	70. 0
Kenya Colony:				
Endoto Mountains	♀	171. 5	195	73. 5
Do	♀	168. 0	197	72. 0
Tana River	♀	168. 0	200	69. 0
Do	♀	165. 5	200	72. 0
Ithanga Hills	♀	166. 5	210	67. 0
Guaso Nyiro	♀	167. 0	211	67. 0
East Guaso Nyiro	♀	170. 0	210	69. 5
Sianna	♀	165. 0	192	70. 0
Ura River	♀	161. 0	------	65. 5
Tanganyika Territory, Bogoti	♀	164. 0	196	67. 0

Zedlitz[76] writes that northern birds have somewhat larger bills than southern ones, but I do not find this to be the case in the series examined.

The postjuvenal molt of this hornbill is incomplete, the rectrices and remiges being unaffected.

The birds collected in northern Kenya Colony during July and August are all in worn plumage but have not commenced to molt.

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[76] Journ. f. Ornith., 1915, p. 26.

In Ethiopia the molt (of the remiges and rectrices at any rate) comes in March and April, as it does in Kenya Colony. As in many hornbills, the tail molt is rather irregular. Thus, one specimen has replaced the middle rectrices only and has them about one-third grown, another has replaced the middle pair, the next pair are old, the next pair new, and the two outer pairs old, while a third individual has the innermost and the outermost rectrices new, the rest old. In the remigial molt, there seem to be two centers from which the ecdysis spreads, the innermost and the next to the outermost primaries. However, here, too, there is considerable variation. A male collected on May 4 at Gato River has replaced primaries 4, 7, and 10, and has not shed the others, which are of the old plumage. It is noteworthy that of the series collected at Gato River (18 birds) between April 1 and May 4, all the specimens that are in molt were mated birds according to the collector's notes. Erlanger[77] found the breeding season in Ethiopia to be in February and March. It appears therefore that the birds remain in pairs until the end of the postnuptial molt. This is rather significant when we consider their nesting habits. The female and young are practically imprisoned in a hole in a tree until the latter are fully grown, and when they first come out of the nest their flight is very weak and uncertain and the light is rather dazzling to their eyes. This I know from personal field experience with *Lophoceros melanoleucos.* The male begins to go through the postnuptial molt while his mate and young are still in the nest, and, inasmuch as he has to be flying to and from the nest with food almost constantly, the molt is necessarily a rather slow, irregular process. The female and the nestlings, however, molt all the wing and tail quills almost at once and the new ones are not fully grown when they leave the nest. In fact, the long rectrices would probably be broken in the crowded confines of the nest if they were to develop to their full length there. The duration of post nesting family association seems to be directly correlated with the completion of the postnuptial molt of the adults (which is synchronous with the development of the juvenal feathering of the young).

Adults vary considerably in the size and presence of white spots on the outer webs of the outer primaries, but this character appears to be wholly individual, and in no way correlated with sex or age. As a rule the two outermost primaries have no white spots; the third has such a spot in about half the birds examined, the fourth and fifth in practically all. There is never more than a single spot on each feather, and the white area varies in length from 9 to 25 millimeters.

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[77] Journ. f. Ornith., 1905, pp. 441–442.

LOPHOCEROS JACKSONI Ogilvie-Grant

Lophoceros jacksoni OGILVIE-GRANT, Ibis, 1891, p. 127: Turkwell, Suk.

Specimens collected:

Male, Sagon River, Ethiopia, June 5, 1912.

Female, Bodessa, Ethiopia, June 1, 1912.

Male and female, Mar Mora, Ethiopia, June 14, 1912.

Two males, Endoto Mountains, Kenya Colony, June 20 to July 23, 1912.

Male, Tana River below camp 3, Kenya Colony, August 16, 1912.

Male, Thika River at Boulder Hill, Kenya Colony, August 28, 1912.

Soft parts.—Adult female, bill all black, iris yellowish brown; subadult male, bill dusky brown with a slightly horn-holored tip and base shading to yellowish.

The differences between *jacksoni* and *deckeni* have been dealt with under the latter species, and the distribution of the former has already been shown to be more or less coincident with that of the latter, except, perhaps in eastern Uganda, where *deckeni* has not been found as yet.

Although the evidence produced by Claude Grant[78] and by Rothschild[79] indicates the specific validity of *jacksoni*, yet it is somewhat strange that of the eight specimens listed above, not one is a very old adult. This is all the more significant when it is remembered that Erlanger and Zedlitz and others considered *jacksoni* the young of *deckeni*. Yet it looks as though there really are two species. Because of the similarity in the immature stages, it may be noted that identification is difficult, and is more a matter of opinion than of fact in some cases. The size measurements of the two forms are similar.

All the specimens are in worn plumage, but are not molting.

In its general habits (as far as known) *jacksoni* agrees with *deckeni*.

Both this species and *L. deckeni* were seen in numbers almost every day during the journey from Endoto Mountains to the Athi River, but, as Mearns did not distinguish between them in his notes, it is impossible to identify his records in any one case.

LOPHOCEROS MELANOLEUCOS GELOENSIS Neumann

Lophoceros melanoleucos geloensis NEUMANN, Journ. f. Ornith., 1905, p. 187: Schekho on the Upper Gelo River, southwest Ethiopia.

Specimens collected:

Two males and one "male" (female?), Meru Forest, near Mount Kenia, Kenya Colony, August 10, 1912.

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[78] Ibis, 1915, p. 275.

[79] Ann. Mag. Nat. Hist., ser. 9, vol. 14, 1924, p. 317.

Soft parts: Iris yellow; bill brownish red, slightly dusky along the commissure, yellow on the sides at extreme base; feet and claws black. The crowned hornbill occurs throughout eastern Africa from southern Ethiopia to South Africa and to Angola. It breaks up into five races, as follows:

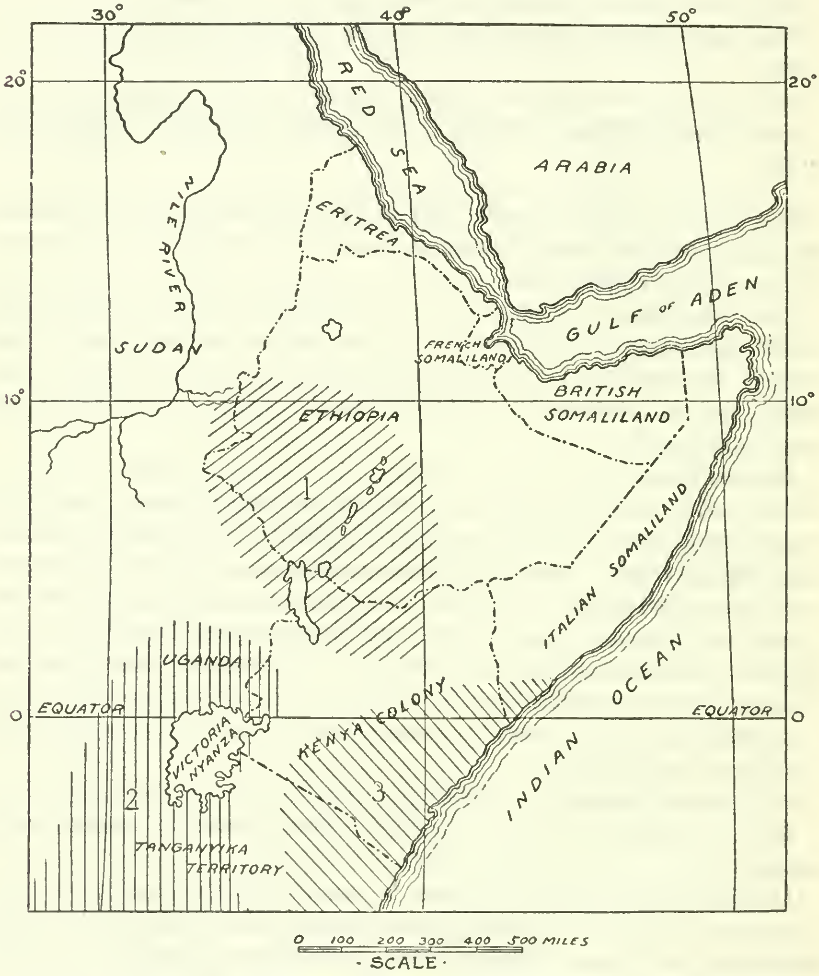

Figure 14.—Distribution of Lophoceros melanoleucos in northeastern Africa. 1, Lophoceros melanoleucos geloensis; 2, Lophoceros melanoleucos stegmanni; 3, Lophoceros melanoleucos suahelicus

1. *L. m. melanoleucos.*—South Africa, Cape Province, Transvaal, and Natal. The whitish stripes on the sides of the head are narrow in this subspecies and there is no white over the eye.

2. *L. m. suahelicus.*—Southern Somaliland, Jubaland, eastern and southern Kenya Colony, eastern Tanganyika Territory, and northern Mozambique. In the south it merges with the typical form, while in

central Tanganyika Territory it intergrades with *stegmanni.* Sclater [80] does not recognize this race, but it seems perfectly justifiable from the material I have examined (15 specimens). Van Someren [81] also agrees that *suahelicus* is a valid race. It differs from *melanoleucos* in having wider white stripes on the sides of the head.

3. *L. m. geloensis.*—Southwestern Ethiopia south to Mount Kenia. This form is somewhat like *suahelicus*, but darker, the general coloration blacker, the white stripes forming a more or less definite band over the eyes according to Neumann. I have seen five specimens of *geloensis* and find that the supraorbital stripe is not a constant character. Van Someren [81] writes that, because the amount of white on the sides of the head varies so greatly, he doubts the validity of this form, which he treats as a probable synonym of *suahelicus.* However, the darker, blacker general color of the upper parts seems to me to be a good character and I therefore admit it. Sclater [80] has also found it valid.

4. *L. m. stegmanni.*—The central African lake district from Lake Nyasa north through western Tanganyika Territory and the eastern Katanga and Ituri, through Uganda and the Ikoma country, east into western Kenya Colony, northeast to the Uasin Gishu. This subspecies differs from *melanoleucos* and *suahelicus* in several ways. It is much darker, being more blackish with a slight touch of a greenish sheen, agreeing in general color with *geloensis* more than with either of the other two. The white streaks on the sides of the head are wider than in *suahelicus* and the bill is slightly darker with a duskier tip, and the size, especially the length of the wing and bill, larger than *suahelicus.* Neumann [82] gives the wing length of *stegmanni* as males, 247–267, females, 230–250 as against those of *suahelicus*, males, 235–245, females, 205–232 millimeters. The material available for examination is not sufficient to enable me to form a definite opinion as to the validity of this race, but I suspect that it may prove to be the same as *geloensis.* The three birds collected by Mearns near Mount Kenia are from the southern end of the range of *geloensis* and may therefore be more or less intermediate between it and *stegmanni.* If the white supraocular stripe is not constant in Ethiopian birds, then *stegmanni* must be synonymized with *geloensis.* Neumann [82] stresses this character of the superciliary so it seems that north Kenian birds are not true *geloensis*, but intermediates between it and *stegmanni.*

5. *L. m. alboterminalis.*—Angola, possibly through Ovampoland to the Southwest African Protectorate. This is the only form of which I have seen no material, but it is said to have the general color of

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[80] Syst. Avium Ethiop., 1924, p. 228.

[81] Nov. Zool., vol. 29, 1922, p. 75.

[82] Orn. Monatsb., 1923, p. 75.

the upper parts much paler—bluish ashy gray, the white streaks on the sides of the head even broader than in *stegmanni*, and has the white superciliary bands present. Without material to examine, I can not form an opinion as to the validity of *angolensis* and therefore tentatively follow Sclater in synonymizing it with this race.

Granvik[83] gives the measurements of a series of what he considers *suahelicus* and records 260 millimeters as the maximum wing length. The present adult male from Meru forest exceeds this by 5 millimeters. I suspect that Granvik's specimens (from Londiani and Mount Elgon, especially those from the latter locality) are not *suahelicus*, but *stegmanni*.

The juvenal plumage resembles that of the adult, but young birds have the bill yellowish rather than reddish, and without any casque whatever. The juvenal bill color appears to last for about a year.

As in so many hornbills the wing molt has two centers of origin—the carpal joint, and the third from the outermost primary. The tail molt begins simultaneously with the middle and the outermost pairs of rectrices.

The crowned hornbill lives in fairly thick bush and around the edges of forests, but it also, although relatively less frequently, occurs in open thornbush country. It appears to be more local than *L. erythrorhynchus* and stays more in higher trees. Erlanger[84] found *L. melanoleucos suahelicus* to be common in the country between Umfudu and Gobwen, and on the island of Gascha, all in southern Somaliland. He collected a juvenal female toward the end of June, but unfortunately does not say whether it was one recently out of the nest or a bird about a year old, so it is impossible to even guess at the breeding season in Somaliland. At Taveta, in southern Kenya Colony, the egg-laying time is in March and April, as I have taken young birds from the nest in the second week of April.

On August 10, at Meru and Kilindini, Mearns recorded seeing about 200 of these hornbills.

LOPHOCEROS HEMPRICHII HEMPRICHII (Ehrenberg)

Buceros (Lophoceros) hemprichii Ehrenberg, in Hemprich and Ehrenberg, Symb. Phys. Av., fol. aa, 1828: Abyssinian coastlands.

Specimens collected:

One unsexed, Ourso, Ethiopia, October 15, 1911.
One male, Serre, Ethiopia, February 13, 1912.
One male, Aletta, Sidamo, Ethiopia, March 7, 1912.
One female, immature, Bodessa, Ethiopia, May 20, 1912.

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[83] Journ. f, Ornith., 1923, Sonderheft, pp. 102–103.

[84] Idem, 1905, p. 441.

Hemprich's hornbill is the only full species of its family entirely restricted to northeastern Africa. It occurs in Eritrea and northwestern Somaliland, throughout Ethiopia, and in the Turkwell district of northeastern Uganda.

Neumann [85] has recently separated the birds of extreme northern Kenya Colony and the Turkwell country under the name *exsul* (terra typica, Moyale). I have seen no examples of this form, but the characters are not too convincing. According to Neumann this form has a wing length (in the male) of 260 millimeters as against 280 to 305 millimeters in *hemprichii.* The male of *exsul* is said to be even smaller than the female of the typical race. It also differs from the nominate form in the color of the bill. While in males of *hemprichii* the whole mandible is cherry red to mahogany red, in *exsul* the base and tomial edge of the mandible are black, and only the middle of the basal part is reddish. The base of the maxilla is said to be much lighter than in *hemprichii*, yellowish gray to reddish white. The color of the bill I find (to judge from dried specimens) to be a matter of age, so that character is ruled out, and the small size may possibly be due to wrong sexing. Jackson's birds (Neumann got his type from the Jackson collection) were largely obtained by native collectors and consequently the sexing is open to question. However, Neumann's work is usually so reliable that I accept his race, at least until I can see some material.

Assuming, then, that *exsul* is valid, the ranges of the two forms are as follows:

1. *L. h. hemprichii.*—Eritrea, Ethiopia, south to the north end of Lake Rudolf, and Somaliland.
2. *L. h. exsul.*—The highlands to the east, west, and southwest of Lake Rudolf (Turkwell, Karamojo, Suk, etc.).

Sclater [86] gives the type locality as "Abyssinian coastlands," but I question if this species breeds in the low coastal belt. Von Heuglin says definitely that this hornbill occurs from 5,000 to 11,000 feet (1,500 to 3,300 meters) in the Dega country, that it is found as well in the Tigre and Ambara district east as far as the Taranta Pass and Mensa. He also writes that he remembers, but not too surely, that he had received specimens from southern Kordofan and the upper White Nile, but this seems to be wrong. Sclater and Mackworth-Praed do not record this species in their list of Sudanese birds. Blanford [87] writes that it is a highland species, but not very common in the parts of northern Ethiopia he visited. He saw it most commonly around Senafé and in the higher parts of the Anseba Valley.

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[85] Journ. f. Ornith., 1928, p. 784.

[86] Syst. Avium Ethiop., 1924, p. 229.

[87] Geol. and Zool. Abyss., 1870, p. 326.

Erlanger[88] gives the clue to the presence of this bird in the lowlands when he writes that it is a mountain bird, but visits the valleys and lowlands during the season when the fruit is ripening. Zedlitz[89] gives us still more information. He says that the birds are to be found west of the eastern Abyssinian-Danakil escarpment, but descend to the lowlands east of it in the spring when, after the winter rains, everything is growing and ripening and, in the highlands the season is more retarded. Thus, he found this species quite common at Ghinda in early February but not in pairs, only in small groups, which observation he correctly interprets as a suggestion that the species is not a breeding bird in the lowlands.

Even in the uplands this species is somewhat nomadic, the ripening of wild fruits being the apparent reason for its wanderings. Thus, although Heuglin found it in the Dega district, and Antinori met with it commonly there, the latter saw it but rarely in the Ambo-Karra region, and the experience of other travelers is similar in that the birds were seen commonly in different places, and were not observed in others of similar nature. In summing up the notes of the leading writers it appears the birds are nomadic rather than local, and their absence or presence in any one place is a temporary one.

The immature female has the bill much shorter than an adult of the same sex in the series examined, and has the mandible and maxilla dark bluish black except at the tips and the distal inch or so of the mandibular tomia, which are pinkish in the dried specimen. The bill in the young bird also lacks the serrations present in the maxillary and mandibular tomia of the adults. In plumage the immature and adult are alike except that the white rectrices are blackish basally in the former and white throughout in the latter.

All in all I have examined only five birds and therefore I can not say much about the size variations of Hemprich's hornbill. However in view of the comparative rarity of this species in many museums, I append the measurements in the hope that they may be of use to other students.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Ourso	♂	288	244	118.5	46
Serre	♂	285	260	112.5	45
Aletta	♂	280	245	121.5	41
Hawash River	♀	260	229	107.5	40
Bodessa	[a] ♀	263	226	89.5	41

[a] Immature.

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[88] Journ. f. Ornith., 1905, p. 439.

[89] Idem, 1910, p. 763.

The two birds taken in October (Ourso) and February (Serre) are in worn plumage, the others March (Hawash River [in M.C.Z.] and Aletta) are in fresh plumage. The immature bird (May) is in worn plumage and was beginning to molt the remiges, only the innermost primary being replaced by a new, partly grown remex. The Ourso bird is similarly commencing to molt, the innermost secondaries being replaced and two-thirds grown.

BUCORVUS ABYSSINICUS (Boddaert)

Buceros abyssinicus Boddaert, Table Pl. Enlum., p. 48, 1783: Ethiopia (See Lath. Syn. Bds., vol. 1, p. 347, 1781).

Specimens collected:

Male, Hawash River, Ethiopia, February 9, 1912.
Male and female, Serre, Ethiopia, February 13, 1912.

Soft parts: Iris dark brown; bill black with an area on sides of maxilla at base orange-vermilion, crossed by blackish bars; throat pouch dark blue with large central area vinous red; feet and claws black; bare skin around eye dark blue. This refers to the male from the Hawash River. Of the Serre male, Mearns writes the bare skin around the eye and the chin dark blue, rest of throat dark vinous red. Of the female, he notes the bare neck and around eye dark grayish blue without red.

Bocage's western form *guineensis* [90] is not distinct from *abyssinicus*. I have compared the present three birds with one from Gambia and find them alike. The measurements are as follows:

Locality	Sex	Wing	Tail	Culmen (chord) from posterior margin of casque	Length of casque	Greatest breadth of casque	Tarsus
Ethiopia:							
Hawash River	♂	562	323	282	93. 5	49. 5	161
Serre	♂	585	370	298	100. 0	50. 0	151
Do	♀	545	335	245	80. 0	47. 0	129
Gambia	------	551	362	278	86. 0	51. 0	138

This species occurs from Gambia across the Sudan to Ethiopia, Bogosland, and Eritrea, south to northern Cameroon in the west, and to the Turkwell River (on the Uganda-Kenya border) and to the northwest of Lake Baringo in the east. Von Heuglin writes that it occurs throughout the whole of Ethiopia and in the adjacent highlands of Habab and Bogosland, and, westward, in Sennar, Kordofan, and the White Nile and Bahr el Ghazal. He did not meet with it in the Samhar country although it was known from Takah and Bogosland. In Shoa Antinori, Harrison, Neumann, and others obtained specimens. The last named [91] met with it at Gallan in Kollu Province, also at Lake Zwai, Lake Ganjule, in Kaffa and in Jimma. It must, however, be somewhat scarce and local in the southern Shoan Lake region as Erlanger did not see it during his memorable voyage in those parts. Donaldson Smith obtained a single specimen at Sheik Mohamed in southeastern Ethiopia, but the species appears to be absent, or at least unknown, from southern Somaliland and Jubaland. I am not aware of any definite records from the Danakil area, the nearest being from Senafé, Ela Bered, and Scetel, all of which are on the western side of the eastern Abyssinian escarpment. The species is a highland form in the eastern part of its range. Blanford [92] found it chiefly at altitudes of from 4,000 to 7,000 or 8,000 feet (1,200 to 2,400 meters), but only occasionally at lower elevations. Von Heuglin gives even greater altitudes. He gives 13,200 feet (3,960 meters) as the upper limit of its range, although he admits that the usual altitudinal distribution is between the limits of 4,620 and 8,250 feet.

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[90] Proc. Zool. Soc. Lond., 1873, p. 698.

Zedlitz [93] found it widely distributed above the outliers of the inland plateau of northern Ethiopia and Eritrea, in the Barca region, and also in the southwestern steppes of the Tacazzé. In the Sudan it occurs at lower levels and the same is true in the western portion of its range. Thus, Lynes [94] writes that in Darfur, "* * * out of the breeding season, which is summer, * * * it * * * might occur * * * almost anywhere * * * bush or woodland, dry or moist ground, high or low, even on the bare crags * * *." It is worthy of mention that Bannerman [95] does not mention this species in his list of the birds of Southern Nigeria, but it occurs in the northern part of Northern Nigeria and in the Chad region.[96] Its western range appears to be conterminous with the Upper Guinean savanna district, extending slightly beyond it, if anything, to the north, but strictly limited to it in the south.

It may be thought peculiar that the range of a bird which is chiefly a highland form in northeastern Africa should extend into relatively low lands in the west but not in the east. The arid Somali belt, however, extends westward through Jubaland and much of northern Kenya Colony and appears to be the barrier that prevents the southward spread of the species into Kenya Colony. The presence in east Africa of a closely related but very distinct species which might, by competition, keep out the northern *abyssinicus* is not to be considered an important factor. Van Someren[97] writes that the ranges of the two do not actually meet. In fact, there seem to be two records of *abyssinicus* in Kenya Colony, Jackson's specimen taken on the Turkwell River, and one from 70 miles northwest of Lake Baringo reported by Grant,[98] collected by the Cozens-Lowe expedition. However, specimens have been taken on a few occasions in low-lying country, such as Blanford's record for Komayli, and Jesse's for Ain, but these are exceptional cases.

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[91] Journ. f. Ornith., 1905, p. 187.

[92] Geol. and Zool. Abyss., 1870, pp. 330–331.

[93] Journ. f. Ornith., 1910, pp. 761–763.

[94] Ibis, 1925, pp. 381–382.

[95] Revue Zool. Africaine, vol. 10, fasc. 2, 1922.

[96] See Grote, Journ. f. Ornith., 1928, p. 760.

Throughout its entire range it is nowhere abundant, being found in pairs or family groups, never in flocks. The birds are more or less sedentary and therefore as widely spaced throughout the country as their territorial requirements demand.

According to Von Heuglin, the mating season is in early autumn, the birds being then found in pairs and both partaking in a booming vocal performance. However, Zedlitz observes that the birds remain in pairs throughout the year and that the young of one season remain with their parents until the next breeding season. He writes that the vocal performance mentioned above was heard by him in mid-April and that the breeding season probably comes in the summer in Ethiopia. Young birds seen in February and March were not fully grown, but as it takes over a year to attain full development this is not necessarily significant. Lynes found the booming courtship to occur in early June in Darfur. He writes that the birds were then, "* * * courting * * * and must have bred in July and August, for the Kulme villagers had a recently fledged young bird on September 20, said to have been taken from a hollow tree near by."

All three specimens collected were molting the wings and tail. Incidentally the order in which the remiges and rectrices are replaced is unusual, and, in the small series available for study, irregular. The male taken on February 9 has new, partly grown outer secondaries while the primary molt is as follows: The outermost primary is of the old plumage, the next three are new and not full grown, the next four are old, the next two, innermost ones, are new. In other words the remigial molt has two more or less simultaneous centers of origin, the carpal, or wrist joint (outermost secondary and innermost primary) and the seventh primary. The male from Serre, February 13, has, however, replaced only the third primary, while the female taken at the same place and date, not only disagrees with the two males, but the molt differs in its two wings.

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[97] Nov. Zool., vol. 29, 1922, p. 74.

[98] Ibis, 1915, p. 270.

In the right wing the fourth primary alone is new, while in the left, the inner secondaries, and the eighth (third from outside) primary are new, the remainder of the remiges old. The rectricial molt is likewise peculiar. Both males have replaced the middle pair; the next pair are old, the next pair new, and the rest old. In the female, the tail molt agrees with that of the wing in being different from the males. The middle rectrices are old, the next one on the right side is new, on the left side, old. The rest are of the old plumage. The body molt in all three is very irregular and very slight. The Hawash River specimen is molting the upper tail coverts; the others are not. The irregularity of molt in this hornbill is interesting in connection with Wetmore's observations on that of the Malayan *Rhinoplax vigil*.[99] A thorough study of the molts of this family should yield interesting results.

The ground hornbill was observed as follows: Abaya Lakes, March 19, 1 bird; Gato River, March 29 to May 17, 10 seen; Bodessa and Sagon River, June 3–6, 2 noted; and Tertale, June 7–12, 2 seen.

Order PICIFORMES

Family CAPITONIDAE

LYBIUS GUIFSOBALITO GUIFSOBALITO Hermann

Lybius guifsobalito Hermann, Tabula Affin. Anim., p. 217, note, 1783: Ethiopia.

Specimens collected:

Five unsexed, Ourso, Ethiopia, July 7 to November 6, 1911. (A. Ouellard collection.)

One adult male, one unsexed, Dire Daoua, Ethiopia, December 15–21, 1911. (Von Zülow collection.)

One adult male, Sadi Malka, Ethiopia, December 21, 1911.

One adult male, Serre, Ethiopia, February 13, 1912.

One male (?), one adult female, Gidabo River, Ethiopia, March 16–17, 1912.

One adult male, Gato River near Gardula, April 13, 1912.

Sclater[1] considers *ugandae* Berger a synonym of *guifsobalito* and recognizes no subspecies of this barbet. In this he is mistaken, as Uganda birds are smaller (shorter wing) and have the yellow and white edges of the remiges noticeably narrower and less conspicuous. Claude Grant[2] writes that the characters of *ugandae* are not substantiated by the British Museum series, but Van Someren[3] writes that he is, "* * * perfectly satisfied that this is a good subspecies * * *." He had 10 Uganda birds, and the 9 Uganda specimens seen by me bear out his observations. The ranges of the two forms are as follows:

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[99] Proc. U. S. Nat. Mus., vol. 47, 1914, pp. 497–500.

[1] Syst. Avium Ethiop., 1924, p. 270.

[2] Ibis, 1915, p. 438.

[3] Nov. Zool., vol. 29, 1922, p. 56.

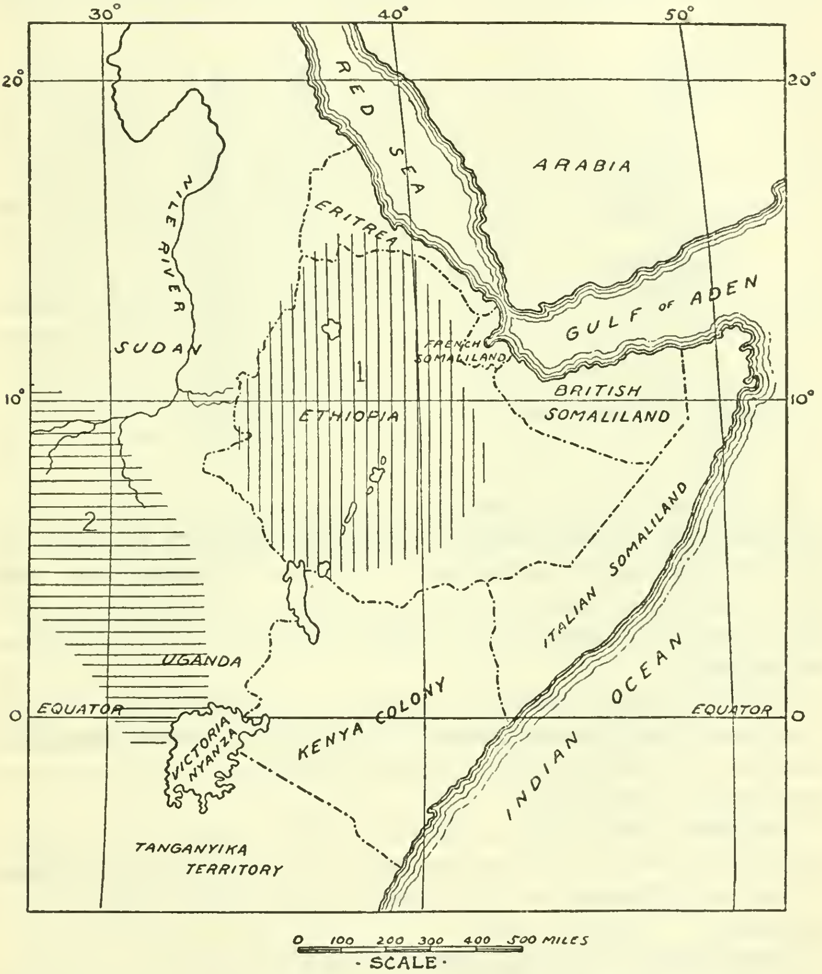

Figure 15.—Distribution of Lybius guifsobalito in northeastern Africa: 1, Lybius guifsobalito guifsobalito; 2, Lybius guifsobalito ugandae

1. *L. g. guifsobalito.*—Bogosland, southwestern Eritrea, and Ethiopia (except the southeastern part), and the Blue Nile district of the Sudan.

2. *L. g. ugandae.*—The Upper Nile savannas of the northeastern Belgian Congo east through Uganda as far as Jinja on the north shore of Lake Victoria. The birds of the White Nile drainage area are intermediates. The wings of *ugandae* measure from 75 to 85 milli-

meters, those of typical *guifsobalito* from 84 to 93 millimeters (according to Van Someren [3] whose figures are higher than the present series). The series examined presents the following size data:

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Ourso		86. 5	48. 5	21. 0	20. 0
Do		89. 0	49. 0	21. 5	24. 0
Do		88. 5	50. 0	21. 5	22. 0
Do		86. 5	50. 0	22. 0	22. 0
Do		89. 5	52. 0	22. 0	21. 0
Dire Daoua	♂	87. 5	49. 0	22. 0	21. 0
Do	?	85. 0	49. 0	22. 0	21. 0
Sadi Malka	♂	88. 0	52. 0	23. 0	21. 0
Serre	♂	90. 0	52. 0	22. 5	22. 0
Gato River	♂	85. 0	46. 0	18. 5	19. 0
Gidabo River	♂ (?)	89. 5	50. 0	23. 5	22. 0
Do	♀	86. 0	51. 5	23. 0	21. 5
Do		89. 0	53. 5	21. 0	21. 5
Do		87. 0	52. 5	23. 0	22. 5
South shore Lake Tsana	♂	88. 5	57. 0	21. 5	20. 5
Do	♀	90. 0	55. 5	23. 0	22. 5
Sudan, Blue Nile, Roseires	♂	88. 0	50. 0	21. 0	21. 0
Do	♀	84. 0	53. 5	20. 0	21. 0

In contrast to these figures, a male example of *ugandae* from Butiaba, Lake Albert, measures as follows: Wing 77, tail 44.5, culmen 19.5, tarsus 20 millimeters. Six other Ugandan males have wings measuring from 79 to 82 millimeters (80.1 millimeters average), and two females have wings of 77 and 80 millimeters, respectively.

Zedlitz [4] considers *rubrifacies* a race of this species, but inasmuch as it comes from the area inhabited by *ugandae* it must be considered a species. It lacks the red on the chin and throat, and agrees in size with typical *guifsobalito*.

Neumann [5] writes that a specimen from Roseires has a much darker red color on the head and throat than birds from Ethiopia. I find no difference in this regard between birds from the two regions.

Young birds differ from adults in lacking the red on the crown, although they have it well developed on the chin and throat; some have a narrow line of red over the bill and eyes. The two Marshalls, in their Monograph of the Capitonidae, 1871, (p. 17), write that in the Derby Museum, at Liverpool, there is a specimen marked *Pogonorhynchus brucei* juv. (=*Lybius g. guifsobalito*) which has the throat brown, "* * * the feathers being lanceolate, and edged with white, the breast and belly white, barred with brown, the lower belly dirty yellow, similarly barred. The forehead is scarlet, the top of the head black; the back is brown, varied with white, and the quills are earthy brown, bordered largely with yellow. This may be a stage of the young bird." Whatever this specimen may be, it certainly is not *L. guifsobalito*. The description agrees best with *L. undatus*, to which species the specimen should probably be referred.

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[3] Nov. Zool., vol. 29, 1922, p. 56.

[4] Journ. f. Ornith., 1910, p. 745.

[5] Idem, 1904, p. 386.

Two of the birds from Ourso (September 5 and October 5) are in molting condition. The tail molt is centrifugal; the wing molt apparently commences at the carpal joint. Another specimen, taken on May 11 on the south shore of Lake Tsana, is likewise in molt. It appears, therefore, that the molting season, and probably the breeding season as well, is of long duration.

Besides the specimens obtained, this species was observed at the following places: Loco near the Gidabo River, March 15–17, 6 seen; Black or North Lake Abaya, March 18, 2; Lake Abaya, March 26–29, 2 seen.

According to Zedlitz this barbet occurs at altitudes of from 1,200 to 2,000 meters (4,000 to 6,600 feet). He found it quite abundant at 1,500 meters (5,000 feet) at Ela Bered, while it was absent in the Barca steppes in the Thornbush country at Tacazzé. Neumann[5] records it as high as 2,200 meters (7,300 feet), and adds that it does not inhabit true forest, but rather the fringe of trees along stream banks.

Erlanger notes that Hilgert observed birds in the process of nest building on November 24 at Abu-el-Kater, while according to Zedlitz the breeding season appears to be during the summer rains; that is, starting not earlier than the middle of March.

LYBIUS ALBICAUDUS SENEX (Reichenow)

Pogonorhynchus senex REICHENOW, Journ. f. Ornith., 1887, p. 59: Ikange, Ukamba, Kenya Colony.

Specimens collected:

Male, Tana River, camp 5, Kenya Colony, August 20, 1912.

Female, Bowlder Hill, Thika River, Kenya Colony, August 28, 1912.

Sclater[6] considers *senex* a distinct species, but, as Van Someren[7] has shown, individuals of this form approach *albicaudus*, which is geographically adjacent to it, and the two are therefore better treated as conspecific aggregates. Incidentally, the Thika River bird is such a connecting type. This barbet, which is local and uncommon, occurs only in Kenya Colony and Tanganyika Territory. The two races may be treated separately.

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[5] Journ. f. Ornith., 1904, p. 386.

[6] Syst. Avium Ethiop., 1924, p. 270.

[7] Nov. Zool., vol. 29, 1922, pp. 55–56.

1. *L. a. albicaudus.*—Extreme southeastern Kenya Colony (Taveta, Teita district, to Mombasa) and northern Tanganyika Territory to Ugogo and the southern and southwestern shores of Lake Victoria north to Kendu Bay. Of this race, *abbotti* Richmond[8] and *usukumae* Neumann[9] are synonyms. The former is merely a fully adult specimen with a pure white tail. When he described it as *abbotti* Richmond had only the description of *albicaudus* in the Catalogue of Birds of the British Museum[10] to go by, and in that account the central tail feathers are stated to be blackish brown at the base; apparently a subadult bird. The case of *usukumae* is a little harder to settle. This form, said to differ from topotypical *albicaudus* in having the white of the underside restricted to the throat and breast, and in lacking a white median stripe extending caudally to the abdomen, is upheld by three specimens from Mwanza in the Museum of Comparative Zoölogy. However, the type of *abbotti* agrees more with *usukumae* than with *albicaudus*, and as it comes from the area inhabited by the latter, *usukumae* must be either a distinct species or an aberrant variation. It is extremely unlikely that two such closely related species could occur together, and, in the absence of true *albicaudus* material, I follow Sclater, who, I presume, has had access to sufficient series, in considering *usukumae* and *abbotti* direct synonyms of *albicaudus*. It should be noted, however, that Granvik[11] recognizes *usukumae*, but makes it a race of *leucocephalus*, in which he is mistaken.

In this race the abdomen is fuscous, the feathers tipped with white and the upper wing coverts also tipped with white.

2. *L. a. senex:*—Kenya Colony from Nairobi and Ukamba to Lumbwa, Fort Hall, the Thika, Luazomela and Tana Rivers. This race has the under parts pure white and the upper wing coverts without white tips in the adult.

Reichenow[12] suggested that *albicaudus* was merely a subadult plumage of *senex*, and Grant[16] agreed, " * * * that the evidence points to that conclusion being correct * * * " and considers that *Lybius leucocephalus* will probably be found to be the juvenal plumage of *senex*. Van Someren collected a series of both young and adults of both *leucocephalus* and *senex* and showed conclusively that the two were distinct species. The young *leucocephalus* is colored the same as the adults. Three young *senex*,

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[8] Auk, 1897, p. 164: Taveta.

[9] Bull. Brit. Orn. Cl., vol. 21, 1908, p. 46: Kagehi, Usukuma.

[10] Vol. 19, 1891, p. 21.

[11] Journ. f. Ornith., 1923, Sonderheft, p. 87.

[12] Vög. Afr., vol. 2. p. 123.

[13] Ibis, 1915, p. 438.

" * * * shot with their parents show quite clearly that this bird has nothing to do with *L. leucocephalus*. The young are coloured like adults, with the exception of the tail, which is suffused with black on the outer edges of the webs." The bird collected by Mearns on the Thika River is a young one; the one from the Tana River is in an intermediate stage, the middle rectrices being pure white. With regard to *albicaudus* I may say that the juvenal and adults are alike in having the abdomen dark fuscous streaked somewhat with white and that the tail feathers are pure white in adults, laterally margined with dusky gray in young birds. There can, then, be no cause for confusing these three birds.

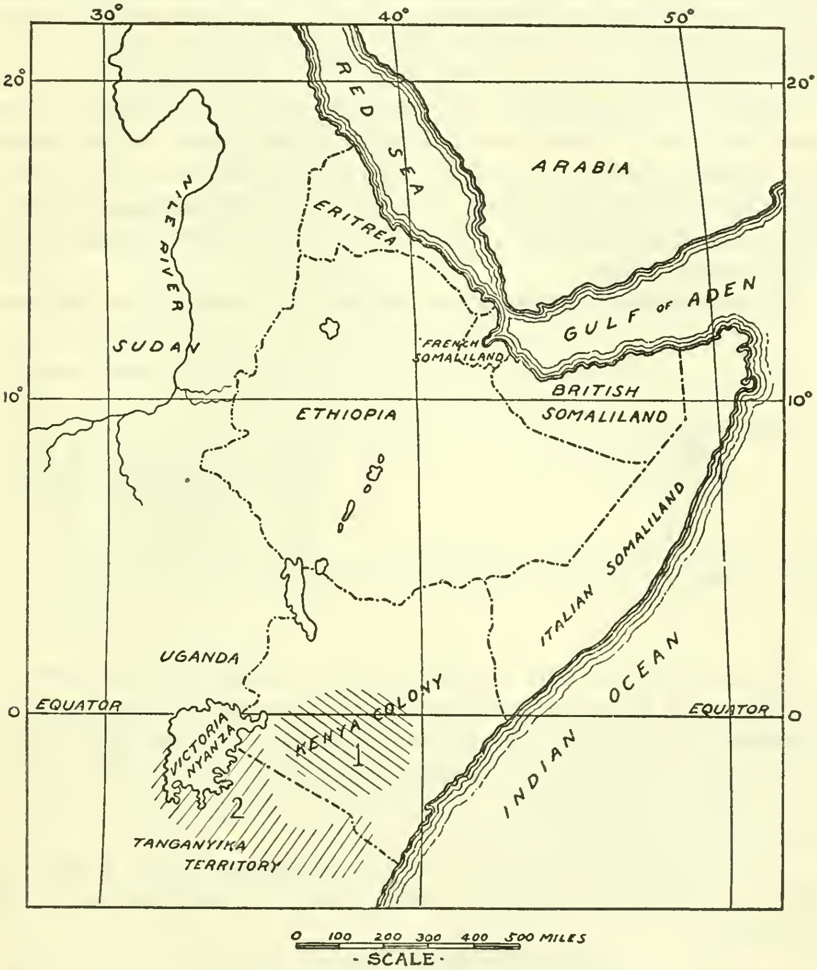

Figure 16.—Distribution of Lybius albicaudus: 1, Lybius albicaudus senex; 2, Lybius albicaudus albicaudus

Granvik[14] writes that a young bird procured by him is not, " * * * blackish brown on the lower back, like the adult, but predominantly white with a few brownish feathers here and there.

> "Undoubtedly the plate given by Lönnberg * * * (Birds coll. * * * Swed. Zool. Exp. * * * B.E.A., 1911) is a picture of a young bird changing to full dress, because in my example the white band on the shoulders extends right across and blends, without any noticeable termination, into the lower white part of the back. As the bird gets older this band gradually disappears, and in the full grown * * * there is no trace of this band at all."

Taking into consideration only the two races of *albicaudus*, it appears that *senex* is more recent than the typical form, as the former occasionally produces individuals with fuscous streaks on the underparts, approaching, but never even closely approximating, the condition found in *albicaudus*. Such cases are commoner among young birds than in adults.

The measurements of the seven specimens examined are as follows:

Locality	Sex	Wing	Tail	Culmen	Tarsus
Kenya Colony:					
Tana River, camp 6	♂	93. 0	48. 0	27. 0	25. 0
Ithanga Hills	♂	96. 0	54. 5	25. 5	22. 5
Nairobi	♂	94. 5	52. 0	24. 0	23. 0
Do	♀	96. 5	52. 5	26. 5	24. 5
Do	♀	94. 0	53. 5	26. 5	23. 5
Thika River	♀	91. 5	30. 0	23. 5	23. 0
Latitude 0° 15′ S., longitude 38° E	♀	98. 0	55. 0	25. 0	24. 5

In adult birds the only noticeable color variation is in the amount and extent of the white spotting on the upper wing coverts and the scapulars. In some birds the coverts are entirely without white spots; others have these feathers broadly tipped with white. The width of the white scapular band is variable, but this is due, in part at least, to the make of the skin.

According to Van Someren the breeding season is in June. At Mwanza, Tanganyika Territory, *albicaudus* has been found nesting in November.

LYBIUS BIDENTATUS AETHIOPS Neumann

Lybius bidentatus aethiops NEUMANN, Bull. Brit. Orn. Cl., vol. 23, p. 29, 1908, Omo region, Ethiopia.

Specimens collected:

Two male adults, Botola, Sidamo, Ethiopia, March 5, 1912.

The validity of the present subspecies has been much debated, a fact which indicates, to say the least, that the characters on which

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[14] Journ. f. Ornith., 1923, Sonderheft, pp. 87–88.

aethiops is based, are not too well marked. Sclater and Mackworth-Praed [15] and Gyldenstolpe [16] reject *aethiops* as a valid race, and synonymize it with *aequatorialis.* On the other hand, Van Someren,[17] Sclater,[18] and Hartert [19] consider it recognizable. The material available to me in the present connection is too meager (as regards *aethiops*) to allow me to weigh the arguments, but I tentatively accept the race with, however, no great confidence in its reality. The races of this barbet, then, are as given by Sclater [18] except that the range of *aethiops* must be extended to include the White Nile, and that of *aequatorialis* to Ruanda and the Bukoba area, Tanganyika Territory, and western Kenya Colony.

Bannerman [20] has reviewed the systematics of this barbet and makes the following observations. Birds from the Sudan and White Nile (10 skins) have wing lengths of from 95 to 103 millimeters and average 98.8 millimeters, while 11 specimens from Ethiopia measure 96 to 102 millimeters, averaging 98.8 millimeters. Certainly, if we are to accept *aethiops* for the Abyssinian bird on the ground of its smaller size, we must unite with it the Sudan birds as they average exactly the same in the wing measurement.

" Neumann correctly pointed out that Niam-Niam specimens were smaller than Uganda birds.

" Thus at a glance:

	Millimeters
L. b. aequatorialis:	
Niam-Niam, Fr. Eq. Afr., North Belgian Congo, wing average	101.5
Uganda, wing average	104.3
L. b. aethiops:	
Sudan, wing average	98.8
Abyssinia, wing average	98.8

" Despite occasional birds appearing to upset these calculations, I consider that the material in the National Collection (Brit. Mus.) * * * proves Neumann to have been justified in separating the Abyssinian form and we must include the Sudan birds with it."

All this suggests a point which I have not the material to investigate and which I therefore pass on to others to settle. The race *aequatorialis* was described from Umparu near Wadelai, a locality, which, according to Bannerman's account, is on the border of the ranges of both *aequatorialis* and *aethiops.* The type, or at least a series of topotypes, of the former ought to be examined and measured. It may be that Neumann redescribed *aequatorialis* when he named *aethiops*, in which case the bird currently known as *aequatorialis* (as distinguished from the smaller, northeastern *aethiops*) would be without a name. The nearest locality to Wadelai whence I have seen birds is Faradje, in the Upper Uelle, Belgian Congo, where Chapin collected several. These birds are *aequatorialis*. While the distance from Faradje to Wadelai is not great in miles (slightly under 150 miles) it must be remembered that the birds of Wadelai are often different from those of the Uelle, and often belong to east African groups or races.

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[15] Ibis, 1919, p. 635.

[16] Kungl. Sv. Vet. Akad. Handlgr., 1924, p. 237.

[17] Nov. Zool., vol. 29, 1922, p. 55.

[18] Syst. Avium Ethiop., 1924, p. 273.

[19] Nov. Zool., vol. 32, 1925, p. 138.

[20] Rev. Zool. Afr., vol. 10, 1922, pp. 102–104.

The size variations of the series examined are as follows:

1. L. b. aequatorialis

Locality	Sex	Wing	Tail	Tarsus
Belgian Congo:				
Faradje	♂	103. 0	78. 5	31. 5
Do	♂	105. 0	77. 0	30. 5
Do	♀	100. 5	73. 0	31. 0
West shore L. Edward	♀	101. 5	78. 0	30. 0
Uganda:				
Chopi, Bosindi	♂	102. 5	75. 5	32. 5
Do	♀	100. 0	76. 0	29. 0
Mabira	------	103. 0	79. 0	30. 5
Ruanda	♂	104. 5	80. 0	32. 5
Do	♀	107. 0	82. 0	29. 0
Tanganyika Territory:				
Bukoba	♂	103. 5	79. 5	30. 5
Do	♂	96. 5	73. 5	30. 5
Do	♂	105. 0	79. 0	32. 0
Do	♀	104. 0	77. 5	32. 0
Do	♀	100. 5	75. 5	30. 0
Do	♀	102. 0	79. 0	30. 0

2. L. b. aethiops

Locality	Sex	Wing	Tail	Tarsus
Ethiopia:				
Botola, Sidamo	♂	100. 0	73. 0	30. 5
Do	♂	101. 5	77. 0	30. 5
Urgessahiver, Limu	♂	96. 0	68. 0	29. 0

One of the two specimens collected by Mearns is in molt, while the other is not.

According to Neumann[21] this barbet lives in dense forest in the valleys at altitudes of from 1,200 to 1,800 meters (4,000 to 6,000 feet), as a rule, although occasionally up to 2,800 meters (9,300 feet), as in Uba and Gofa. It does not occur in the Hawash Basin.

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[21] Journ. f. Ornith., 1904, pp. 385–386.

TRICHOLAEMA MELANOCEPHALUM MELANOCEPHALUM (Cretzschmar)

Pogonias melanocephala Cretzschmar, in Rüppell's Atlas, p. 41, pl. 28, 1829: Kordofan, probably Ethiopia.

Specimens collected:

One male and two females, Sadi Malka, Ethiopia, January 28–31, 1912.

This species of barbet occurs in eastern Africa from central Tanganyika Territory north to Bogosland. It divides into three races, as follows:

1. *T. m. melanocephalum.*—Bogosland and northern Ethiopia south as far as Adis Abeba, east to Samadu near Harrar. It may occur in adjacent portions of the Anglo-Egyptian Sudan as well, as the type locality was originally thought to be Kordofan, but Sclater and Mackworth-Praed [22] state that probably Rüppell's birds came from Ethiopia as the form has not been noted since then in the Sudan. This race has the crown, nape, chin, and throat black.
2. *T. m. stigmatothorax.*—Southern Ethiopia (Tertale) south through the country around Lakes Rudolf and Stefanie across Kenya Colony and southern Somaliland, to northern Tanganyika Territory (as far south as Dodoma on the central railway line. Sclater [23] gives the Kilimanjaro district as the southern limit, but Loveridge collected two birds at Dodoma, about 200 miles to the south. In this race the black of *melanocephalum* is replaced by dark brown.
3. *T. m. blandi.*—Central and eastern Somaliland from the Goolis Mountains to Obbia. This race, of which I have seen no material, is said to be similar to *stigmatothorax* in having the crown, nape, auriculars, chin, and throat brown, but to differ from it in having the feathers of the forehead and throat distinctly tipped with whitish.

In the northern half of Ethiopia the black-throated barbet appears to be relatively less numerous than its brown-throated representative is further south. Blanford [24] writes that he saw this bird only near the coast, in Eritrea, where he obtained specimens at Komayli and Ailat. He says that this is a lowland bird, characteristic of the tropical zone.

One of the females is in molting condition, the tail being the part affected. The measurements of the specimens are as follows:

Male: Wing 67.5, tail 38.5, culmen 17.5, tarsus 19.0 millimeters.
Female: Wing 64.5, tail 39.0, culmen 18.5, tarsus 19.0 millimeters.
Female: Wing 66.0, tail 38.0, culmen 18.0, tarsus 19.0 millimeters.

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[22] Ibis, 1919, p. 637.
[23] Syst. Avium Ethiop., 1924, p. 275.
[24] Geol. and Zool. Abyss., 1870, p. 310.

TRICHOLAEMA MELANOCEPHALUM STIGMATOTHORAX Cabanis

Tricholaema stigmatothorax CABANIS, Journ. f. Ornith. 1878, p. 205: Ndi, Teita district, Kenya Colony.

Specimens collected:

Three adult males, Tertale, Ethiopia, June 8–9, 1912.

One adult female, Hor, latitude 3° 19′ N., Kenya Colony, June 30, 1912.

One adult female, Indunumara Mountains, Kenya Colony, July 14, 1912.

One adult male, Endoto Mountains, Kenya Colony, July 20, 1912.

One adult male, Er-re-re village, Kenya Colony, July 25, 1912.

One adult female, 24 miles south of Malele, Kenya Colony, July 29, 1912.

The birds from Tertale and the one from the Indunumara Mountains are darker on the head and throat than the rest of the series or than nine other specimens from Kenya Colony and Tanganyika Territory, and are somewhat intermediate between this race and the typical form, but nearer the former. When we consider that they come from the more northern part of the range of *stigmatothorax*, this is not surprising. If these intermediates were geographically progressive in their degree of intermediacy, it might be possible to name the north Kenian bird, but such is not the case. The specimen from Hor is lighter, like practically topotypical *stigmatothorax*. The size variations are wholly individual as may be seen from the following table:

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Tertale	♂	68. 0	39. 5	17. 5	18. 5
Do	♂	64. 5	35. 0	16. 5	18. 5
Do	♂	65. 0	35. 0	16. 5	18. 5
Kenya Colony:					
Endoto Mountains	♂	62. 5	35. 0	16. 5	18. 0
Er-re-re village	♂	66. 0	37. 5	15. 5	18. 0
Hor	♀	63. 0	34. 0	17. 0	20. 0
Indunumara Mountains	♀	62. 5	34. 0	16. 0	19. 0
24 miles south of Malele	♀	62. 0	34. 0	16. 0	19. 5

Sclater[25] lists *Tricholaema flavibuccale* Reichenow as "probably = *T. m. stigmatothorax*." Although I have seen nothing but the original description of *flavibuccale*[26] and the colored figure given by Richenow,[27] and although the species has never been rediscovered since the unique type was taken, I can not agree with Sclater that it is probably an aberrant *stigmatothorax*. Aside from the fact that the anterior parts of the white cheek stripe and of the supercilium are yellow, the dark parts of the head and throat are black, not brown. If the bird lacked the yellow, I should be inclined to consider *flavibuccale* either an itinerant example of typical *melanocephalum* or an extremely dark, melanistic *stigmatothorax*. If it were brown instead of black and had the yellow, I should look upon it (with suspicion) as a xanthochroistic *stigmatothorax*, but I know of no instance in any group of birds of melanism and xanthochroism being present in the same individual. The possibility of its being a hybrid between *stigmatothorax* and *T. diadematum massaicum* seems rather remote. It looks like a distinct species.

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[25] Syst. Avium Ethiop., 1924, p. 275.

[26] Orn. Monatsb., 1893, p. 30.

[27] Vög. Afr., Atlas, 1902, pl. 5, fig. 1.

Van Someren [28] writes that young *stigmatothorax* have the same coloration as adults but are somewhat duller in general appearance. The material available for study is not sufficient to prove or to disprove this, but the following suggestion is brought out by a critical comparison of skins. The adult birds undergo a complete postnuptial molt at the time when the young are a week or so out of the nest; the molt sometimes begins even before the young leave the nest but usually later. Thus, by the time the juvenile birds are full grown, their feathers are more worn and faded than the new plumage of their parents. Young birds are usually quite abraded in plumage in a short time after quitting the nest, and it follows that the difference that Van Someren attributes to age may well be due to wear. The difference between fresh and old plumage in adults is quite noticeable, the latter being duller, browner, less fuscous, than the former.

Adult birds vary markedly in the presence or absence of yellowish or tawny-buff tips to the feathers of the forehead and anterolateral margins of the pileum. The variations appear to be uncorrelated with sex, age, wear, or season. One specimen, a male from Tertale (U.S.N.M. 244314), has some of the forehead feathers tipped with orange red instead of yellow. This same individual also has the reddish belly streak much brighter and better developed than any of the others examined.

Two of the series collected are in molting condition. The following facts are indicated (by these and other molting birds examined): 1. The remigial molt has two centers of origin—the carpal joint and the fifth primary from the outside. 2. The tail molt is centripetal and begins very slightly before the wing molt. 3. The body molt appears to be irregular and is coincident in time with that of the wings and tail.

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[28] Nov. Zool., vol. 29, 1922, p. 56.

In addition to the specimens listed, Mearns observed this barbet on the Tana River near the mouth of the Thika River, August 23–26, 2 birds; on the Thika River, August 26–27, 4; Athi River, August 30–31, 6 seen.

TRICHOLAEMA LACRYMOSUM LACRYMOSUM Cabanis

Tricholaema lacrymosa CABANIS, Journ. f. Ornith., 1878, p. 205: Adi River; i. e. Athi River, Kenya Colony.

Specimens collected:

One male, one female. Tana River, 1,200 feet, Kenya Colony, August 15, 1912.

Jackson[29] has recently described a race of the spotted-flanked barbet from Doinyo Narok, Kenya Colony, as *T. l. narokensis* on the basis of its having the black spots on the sides and flanks much larger, the belly more strongly washed with sulphur yellow, and the wings longer, than in the typical form. All of these characters are variable in a series of 17 *lacrymosum* studied in the present connection, and I therefore consider Jackson's name a pure synonym of the nominate form.

There are three subspecies of this bird currently recognized, and which I can make out with the material available. They are, however, not above suspicion.

1. *T. l. lacrymosum.*—From Wadelai, northern Uganda, Turkanaland, and Mount Elgon, east to the country south of Lake Rudolf and to the Northern Guaso Nyiro, south through Kenya Colony except the coastal strip and the Kavirondo country, to northern Tanganyika Territory east of the Rift Valley, south to Kilosa and Morogoro, but not to Dodoma.

2. *T. l. radcliffei.*—Uganda from Lake Albert southeast to Tororo and south to the shores of Lake Victoria (absent from extreme western Toro and Ankole districts) south to the Bukoba and adjacent parts of Tanganyika Territory as far as northwestern shore of Emin Pasha Gulf (southwest Victoria Nyanza), and east to the north Kavirondo country, where, however, it intergrades with typical *lacrymosum*. This race differs from the nominate form in having the black spots on the flanks and sides more rounded, less tear-shaped.

According to Van Someren[30] the typical race inhabits the eastern province of Uganda (specimens from Sio River and Jinja). However, the birds of eastern Uganda are rather intermediate in nature as in range.

3. *T. l. ruahae.*—The inland plateau of southeastern Tanganyika Territory from the valleys of the Ruaha and Rufigi Rivers in the

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[29] Bull. Brit. Orn. Cl., vol. 43, 1923, p. 167.

[30] Nov. Zool., vol. 29, 1922, pp. 56–57.

Uhehe country north to Dodoma and Mahaka. Similar to *radcliffei* in having round spots, but differs in being whiter, less yellowish, below.

In this barbet the juvenal plumage resembles the adult stage. The sexes are alike. The molting specimens examined are not sufficiently diverse in their respective stages to enable me to tell much of the order of feather renewal except that the caudal molt is centrifugal and slightly precedes the alar molt.

The species inhabits the Acacia thorn bush country throughout its range.

TRICHOLAEMA DIADEMATUM DIADEMATUM (Heuglin)

Laemodon diadematum Heuglin, S. B. Akad. Wien, 1856, p. 299 (nomen nudum).

Pogonorhynchus diadematus Heuglin, Ibis, 1861, pp. 124, 126, pl. 5: Steppes of the Kitsch-Negroes, i. e., upper White Nile.

Specimens collected:

Two male adults, one female adult, Dire Daoua, Ethiopia, December 6–21, 1911.

Two female adults, Hawash River, Ethiopia, February 10–12, 1912.

Five male adults, one male juvenal, six female adults, Gato River near Gardula, Ethiopia, April 6 to May 11, 1912.

One male juvenal, Mar Mora, Ethiopia, June 14, 1912.

The two juvenal birds fit the description of Reichenow's *Tricholaema nigrifrons*[31] except that they are not heavily spotted below, and the margins of the rectrices and remiges are yellow, not whitish. Erlanger[32] showed that *nigrifrons* was the young of *massaicum*, but hitherto the first plumage of typical *diadematum* has not been recorded.

The systematics of the red-fronted barbet present some difficulties, which I am afraid I can outline better than I can dispose of. The birds inhabiting the upper White Nile, southern Ethiopia, northern Uganda, and northern Kenya Colony are unspotted or only very slightly spotted on the underparts, while the race *massaicum* of southern Kenya Colony and the northern half of Tanganyika Territory is usually heavily spotted on the venter. However, birds occur far to the south in the range of *massaicum* which agree in plumage with *diadematum*. Thus, two specimens from Dodoma, Tanganyika Territory (A. Loveridge collection), are *diadematum* in every respect, being wholly unspotted on the breast and belly and only dully marked on the flanks. The question then arises as to whether the northern form is migratory and may therefore occur at times in the range of *massaicum*. These two specimens can not be said to be immature, as they have the red on the forehead and crown well developed and have the maxillary tomia with well-developed "teeth," one on each side.

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[31] Journ. f. Ornith., 1899, p. 418.

[32] Idem, 1905, p. 493.

The southernmost race, *frontatum* (terra typica, Angola), which unfortunately I have not seen, is the most heavily marked on the undersides. It follows that *massaicum* is, both geographically and in its plumage characters, intermediate between *diadematum* and *mustum*, and *frontatum*. Are we then to explain the appearance of unspotted birds in the northern half of Tanganyika Territory, where most of the birds are spotted, on the basis of the intermediacy of *massaicum?* In this connection it may be noted that Van Someren[33] writes that *massaicum* is "* * * heavily spotted on the underside in both adult and young. Some birds, however, are not so heavily spotted as others." If we assume the variational limits of the intermediate to include in its range those of both the peripheral races, then we can not draw a line anywhere and would have to discard the idea of the subspecific reality of *massaicum*. However, since by far the majority of the birds from the range of that form agree with the characters ascribed to it by Reichenow in his original description, it certainly seems valid, and the occasional *diadematum*-like specimens are probably wandering migrants from farther north. But, here again, we must remember that there is no other evidence, no evidence based on observations of living birds in Africa, to support the suggestion that this barbet is even partly migratory. Barbets of other species (*Tricholaema hirsutum*, for example) are known to wander about in accordance with the ripening of certain wild fruits, but the present species is known to feed extensively on termites as well as on fruit. The two Tanganyikan examples of *diadematum* examined by me were collected on December 22. It remains to be discovered if this is in the nonbreeding season of this species.

The races of *T. diadematum* are as follows:

1. *T. d. diadematum.*—The upper White Nile (Mongalla and Lado, where it is uncommon), northwestern Uganda (Masindi, Kyetume), east to central and southern Ethiopia from Dire Daoua and the Hawash Basin (Arba, Dadadjamalka, etc.) to northern Somaliland, south through Shoa to Mar Mora and the northern end of Lake Stefanie. On migration (?) as far south as Dodoma, Tanganyika Territory. Characters: Underparts unspotted or only very slightly so; wings 72.80 millimeters in length.

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[33] Nov. Zool., vol. 29, 1922, p. 57.

2. *T. d. mustum.*—Northeastern Uganda (Mount Moroto, Turkwell River, etc.) east through Kenya Colony as far south as Mount Kenia. Characters: Like *diadematum* but larger, wings 80 to 85 millimeters.

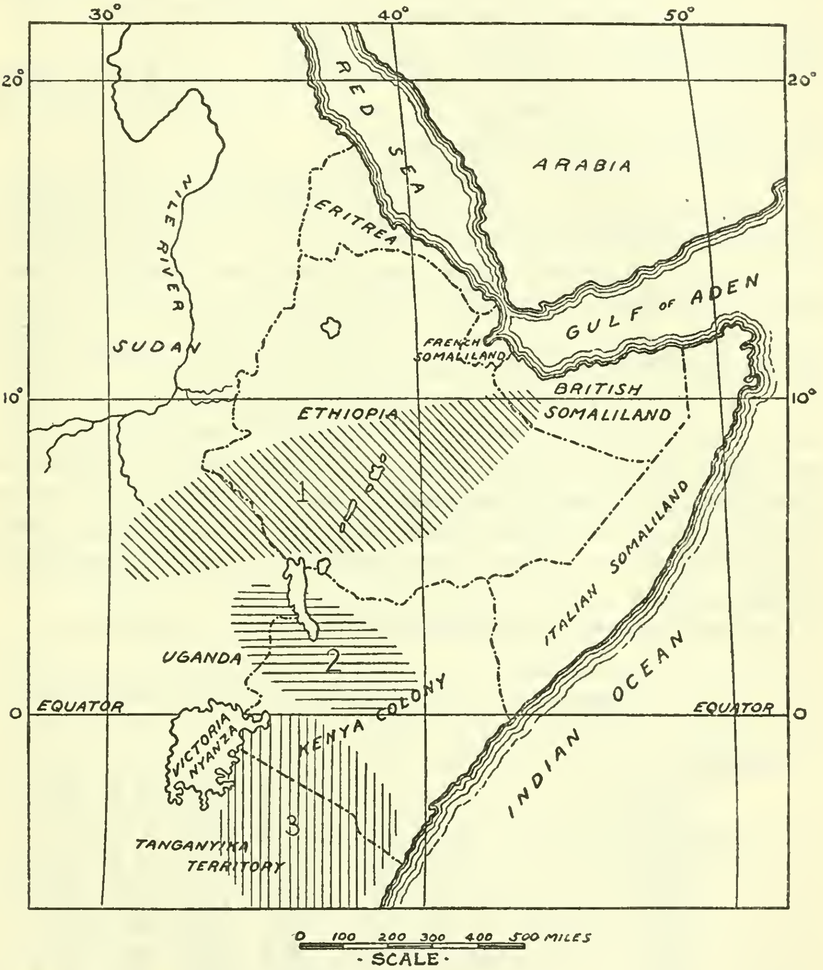

Figure 17.—Distribution of Tricholaema diadematum: 1, Tricholaema diadematum diadematum; 2, Tricholaema diadematum mustum; 3, Tricholaema diadematum massaicum

3. *T. d. massaicum.*—Southern Kenya Colony (Naivasha, Kisumu, Nakuru, Nairobi, Simba, Tsavo, Sianna, etc.) and the northern half of Tanganyika Territory (south to the central railway line). Characters: Similar in size to *mustum* but with the underparts abundantly spotted. There is some variation, however, in the spotting, some birds having fewer of these marks than others.

4. *T. d. frontatum.*—Nyasaland, west through the Katanga to Angola. Unfortunately, I have seen no material of this form, but it appears to be well marked and has been accepted by all investigators who have had to deal with it. *T. alexanderi* Shelley is a synonym. Characters: Similar to *massaicum* but the breast and lower throat more strongly yellowish, the ventral spots larger and darker, the yellowish margins of the wing feathers darker.

The series of the typical form brought back by the Frick expedition illustrates the following facts, hitherto unrecorded, concerning the plumages and molts of this barbet.

The juvenal plumage, as already noted, differs from the adult type, only in that it lacks the red on the forehead and crown, which are black like the occiput in the young birds. The juvenal plumage is worn but a short time when a very incomplete postjuvenal molt begins. This molt affects only the antero-dorsal part of the head and is easily observed because the new feathers are red, not black. The result of this molt is a plumage identical with that of older birds. One of the two young birds (the one from Mar Mora) is just starting to show red on the forehead, and the rest of the plumage is still very fresh, like that of the other immature specimen, in which no sign of postjuvenal molt is present, so it follows that the red feathers appear at no great length of time after the juvenal feathers have attained full growth. Both young birds have smooth (not notched) maxillary tomia.

The size measurements of the adults collected are as follows:

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Dire Daoua	♂	79.5	48.0	18.0	20.0
Do	♂	79.0	47.0	18.0	20.0
Do	♀	77.0	44.5	18.0	20.0
Gato River	♂	77.0	43.0	19.0	18.0
Do	♂	78.5	45.5	18.5	19.0
Do	♂	77.0	44.0	19.0	19.0
Do	♂	77.5	44.5	18.5	19.0
Do	♂	77.0	45.5	18.5	20.0
Do	♀	76.5	46.0	19.0	19.5
Do	♀	75.0	43.0	19.0	19.5
Do	♀	80.0	45.0	18.5	19.0
Do	♀	76.0	43.5	17.5	19.0
Do	♀	77.0	43.0	18.0	20.0
Do	♀	78.0	43.0	19.0	20.0
Hawash River	♀	77.0	43.5	18.0	19.5
Do	♀	75.0	44.0	17.5	19.0

The adults vary considerably with regard to the amount of white in the nape, but the variations are purely individual. The tail molt is centrifugal; the wing molt has two centers of origin, the carpal joint and the fifth primary. Molting birds were taken in December and in April.

According to Erlanger[34] the breeding season is in December and January in Ethiopia.

POGONIULUS PUSILLUS UROPYGIALIS (Heuglin)

Barbatula uropygialis Heuglin, Journ. f. Ornith., 1862, p. 37; Ain Saba. Eritrea.

Specimens collected:

Five adult males, three adult females, Sadi Malka, Ethiopia, December 21, 1911, to January 29, 1912.

One adult female, Hawash River, Iron Bridge, Ethiopia, February 5, 1912.

Two adult males, one adult female, Bodessa, Ethiopia, May 2–29, 1912.

One adult male, one adult female, Sagon River. Ethiopia, June 6, 1912.

One adult male, El Ade, Ethiopia, June 13, 1912.

In studying the systematics of this tinker bird I have examined a series of 30 specimens representing all three races, and my conclusions agree with those reached by C. H. B. Grant[35] and by Sclater.[36] The geographic forms are as follows:

1. *P. pusillus pusillus.*—Eastern Cape Province (west as far as Grahamstown and Algoa Bay), Pondoland, and Natal to the coastal districts of Zululand and of Swaziland. This race has yellow streaks on the occiput, nape, and interscapulars, is pale olive green on the underparts, the throat yellower, less olivaceous, and is larger than either of the other forms, the wing length in the specimens examined being 60–61 millimeters.

2. *P. pusillus affinis.*—From southern Somaliland, northern Kenya Colony and northwestern Uganda (Moroto and Turkwell districts). south through Kenya Colony to northern Tanganyika Territory from the Ikoma region to Dar es Salaam. This subspecies has white streaks on the occiput, nape, and interscapulars; is much paler, not olivaceous, below than the typical race (sometimes almost whitish with a faint yellowish buffy wash), and is smaller; wings 50–58 millimeters.

3. *P. pusillus uropygialis.*—Eritrea, Bogosland, and all of Ethiopia and also in northern (that is, French and British) Somaliland; doubtfully in the Sudan. Sclater and Mackworth-Praed[37] note that

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[34] Journ. f. Ornith., 1905, p. 493.

[35] Ibis, 1915, pp. 443–444.

[36] Syst. Avium Ethiop., 1924, p. 280.

[37] Ibis, 1919, p. 638.

Heuglin[38] records this bird from Khartoum and the Blue Nile, but they write that they have seen no Sudanese examples and that A. L. Butler never met with this species in his many years in that country. Van Someren[39] writes that, "* * * it is possible that this race extends to North Rudolf." In this he is probably correct, as the specimens collected by Mearns at El Ade and Sagon River are *uropygialis*. The race is like *affinis* in the color of the dorsal head and mantle streaks, but is slightly darker, more olivaceous below, and in about a third of the cases has a red or reddish-orange patch on the rump. This bright patch (which is small, restricted to the

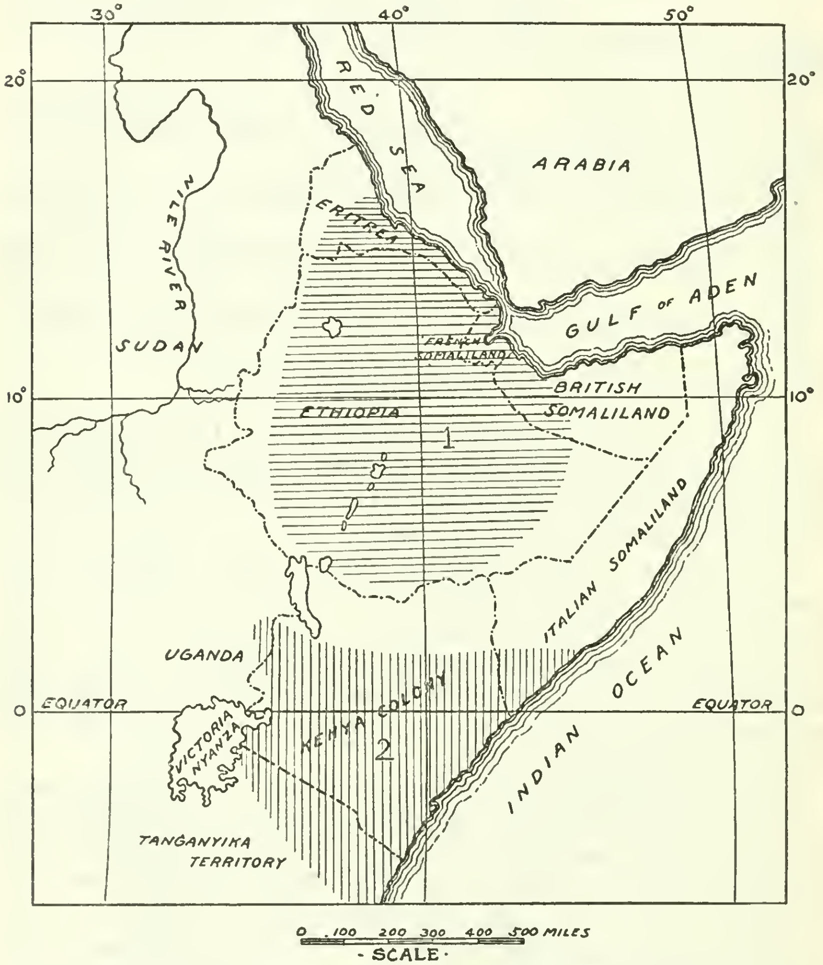

FIGURE 18.—DISTRIBUTION OF POGONIULUS PUSILLUS IN NORTHEASTERN AFRICA: 1, POGONIULUS PUSILLUS UROPYGIALIS; 2, POGONIULUS PUSILLUS AFFINIS

tips of only a few central rump feathers) is present in 6 out of 15 specimens listed above. Van Someren notes that of 16 specimens examined by him only 5 had any red on the rump. The wings measure 51–58 millimeters, agreeing with *affinis* rather than with *pusillus*.

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[38] Orn. N. O.-Afr., p. 762.

[39] Nov. Zool., vol. 29, 1922, p. 60.

An examination of the plumage of the present series shows birds in fresh and in worn condition in the same region at the same time. The only fact that I can ascertain about the molting process is that it starts in the wings before it does in the tail, but even this, based on two molting birds, needs further corroboration. The size variations are as follows:

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Sadi Malka	♂	55	30. 0	11. 0	15. 0
Do	♂	55	29. 5	12. 0	14. 5
Do	♂	55	33. 5	12. 5	14. 5
Do	♂	53	30. 0	11. 0	14. 0
Do	♂	55	32. 0	12. 0	14. 0
Bodessa	♂	52	29. 0	11. 5	14. 5
Do	♂	55	28. 0	11. 5	14. 0
Sagon River	♂	52	27. 0	11. 0	13. 0
El Ade	♂	53	30. 0	11. 0	14. 0
Sadi Malka	♀	55	30. 5	12. 5	14. 5
Do	♀	58	31. 5	12. 0	12. 5
Do	♀	55	29. 0	12. 0	15. 0
Hawash River	♀	57	30. 0	12. 0	14. 5
Bodessa	♀	54	28. 0	11. 0	15. 0
Sagon River	♀	51	25. 5	12. 0	14. 5

Erlanger[40] has suggested that since these birds are so variable with regard to the red rump patch, that it may be that only fully adult birds attain that plumage character. While this is purely an assumption with no basis of facts, nevertheless the numerical ratio of individuals with red on the rump to those without is about what one might expect to find of fully adult (say two years old) birds to younger ones (not counting juvenal birds).

These little barbets live in the dense underbrush of relatively open forest country. Little is definitely known of their breeding habits or season, but Erlanger[40] says that in Ethiopia and Somaliland they nest in holes in trees during February and March.

POGONIULUS PUSILLUS AFFINIS (Reichenow)

Barbatula affinis Reichenow, Orn. Centralb., 1879, p. 114: Kipini, mouth of the Tana River.

Specimens collected:

Male, Endoto Mountains, south, Kenya Colony, July 23, 1912.

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[40] Journ. f. Ornith., 1905, p. 494.

This specimen is in poor condition for study, being badly damaged by shot, and is in molt, and also somewhat stained. As far as can be ascertained it is *affinis*, not *uropygialis*, although the color of the breast is somewhat darker than usual for the former race.

A series of 10 birds shows considerable variation in color. A few have some of the light occipital streaks yellowish instead of white, and two from the southern limit of the range (Dar es Salaam) are much lighter below and slightly smaller than any of the others.

This race and *uropygialis* differ so slightly in many cases that it is difficult to demarcate their respective ranges very definitely, or to identify single specimens from the northern part of the range of *affinis* or the southern portion of that of *uropygialis*.

The type locality of this form is Kipini, not Xipini as given by Sclater.[41]

POGONIULUS CHRYSOCONUS XANTHOSTICTUS (Blundell and Lovat)

Barbatula xanthosticta Blundell and Lovat, Bull. Brit. Orn. Cl., vol. 10, p. 21, 1899: Chellia, Ethiopia.

Specimens collected:

One male, Arussi Plateau, 9,000 feet (2,700 meters), Ethiopia, February 20, 1912.

One male, near Loco, Sidamo, Ethiopia, March 6, 1912.

In the absence of sufficient material to attempt a revision of the races of this tinker bird, I follow Sclater[42] and refer the present two specimens to *xanthostictus*. Their measurements are as follows: Wing 59–62.5, tail 32.5–34.0, culmen 12.0–12.5, and tarsus 14–16 millimeters (the first measurement in each case refers to the Loco specimen).

This race inhabits the highlands of central and southern Ethiopia southwest to the Shoan lake district. The Arussi bird was found in the juniper forest. Besides the two specimens collected, the species was recorded as follows: Aletta, March 7–13, 20 seen; Loco, March 13–15, 20 seen; Gidabo River, March 15–17, 20 seen; Black Lake Abaya, March 18, 20 seen; Galena River, March 19–20, 40 seen; Lake Abaya, southeast, March 21–27, 10 seen; White (or South) Lake Abaya, March 24–26, 25 seen; Spring, south of Lake Abaya near Gardula, March 26–29, 10 seen; Gato River near Gardula, March 29 to May 17, 50 seen; Anole Village, May 18, 2 seen.

Erlanger[43] writes that the breeding season is in December and January, but it should be noted that he did not find any nests, eggs, or young, but judged solely by the condition of the two males and the single female he collected. Lynes [44] found that the closely allied race *schubotzi* was nesting in April in Darfur.

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[41] Syst. Avium Ethiop., 1924, p. 280.

[42] Idem, 1924, p. 281.

[43] Journ. f. Ornith., 1905, p. 495.

POGONIULUS BILINEATUS ALIUS Friedmann

Pogoniulus bilineatus alius FREIDMANN, Auk, vol. 47, no. 1, Jan. 1930, p. 86: Nairobi, Kenya Colony.

Specimens collected:

One male, two females, Escarpment, 7,390 feet, Kenya Colony, September 7–10, 1912.

The golden-rumped tinker bird is found throughout eastern Africa from Mt. Elgon, Kakamegoes, Molo, the Ukamba and Kikuyu regions of Kenya Colony, south through Tanganyika Territory, Mozambique, Nyasaland, and eastern Rhodesia to the eastern Transvaal, Zululand, and Natal. Throughout this territory, however, the species is present only in a relatively small per cent of the total area, being very local, and absent in wider areas than it is present in. For example, in Tanganyika Territory one race (*fischeri*) inhabits only the narrow coastal strip, another (*conciliator*) is found only in the Uluguru Mountains, and none of these barbets have been found anywhere else in all the vast extent of that country.

Sclater,[45] following and bringing up to date Neumann's revision of the systematics of this barbet [46] recognizes five races. Since then, two additional ones have been described (*conciliator* and *alius*), making seven in all. The races are as follows:

1. *P. b. bilineatus.*—Southeastern Africa from Natal, Zululand, and the eastern Transvaal, north through eastern Rhodesia to Nyasaland and southwestern Tanganyika Territory (east shore of Lake Nyasa east to Songea). This is a large race with wings of 56–58 millimeters in length; with a deep golden yellow rump, and white superciliaries, malar stripe, chin, and throat.

2. *P. b. urungensis.*—The country around Kasanga and Urungu, at the south end of Lake Tanganyika. This form will probably be found to occur farther south and southeast in the Livingstone Mountains. Slightly smaller than *bilineatus* (wing 55–56 millimeters), the rump lemon yellow instead of deep golden yellow (none seen by the present reviewer).

3. *P. b. kandti.*—The Lake Kivu district. This race was described from a single specimen, which, as far as I know, is still unique. This race is said to be nearest to *urungensis* but has the rump slightly lighter in color. Sclater says that this form is only doubtfully distinct from the typical one. If this be found to be true, then we should expect either to find *bilineatus* occurring in

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[44] Ibis, 1925, pp. 349–350.

[45] Syst. Avium Ethiop., 1924, p. 283.

[46] Journ. f. Ornith., 1907, pp. 345–346.

the highlands of Uhehe, the Kiombo Mountains, and Urundi and Ruanda, linking the Kivu region with the Songea area, or that *urungensis* would prove to be identical with *bilineatus*. Otherwise, the characters on which these races are based have no geographical continuity.

There is some doubt as to where the type of *kandti* really came from. It was collected by a missionary named Kandt who was stationed near Lake Kivu, but who collected birds in many places in eastern Africa as his wanderings were fairly extensive, and all his birds were sent to Reichenow as a collection from "Lake Kivu." It may be that it actually came from the south end of Lake Tanganyika, in which case *kandti* would be a pure synonym of *urungensis*.

4. *P. b. fischeri*.—The coastlands of east Africa from Mombasa to Mikindani. Sclater[45] limits this bird to the coastal strip from Mombasa to Zanzibar, but Grote[47] collected two birds at Mikindani which approach *fischeri* in their characters, and may best be referred to that form. This race is the lightest, brightest yellow (least greenish) on the underparts of any of the subspecies of this tinker bird. It is small in size (wings 50–52 millimeters), has the superciliaries and malar stripe lightly washed with pale yellowish, and has the yellow edges of the wings and tail as dark as in the typical form.

5. *P. b. conciliator*.—The Uluguru Mountains, Tanganyika Territory. Similar to *fischeri* in size (wings 51.5–53 millimeters) and in coloration except that the lower breast and belly are darker, more greenish olive.

6. *P. b. jacksoni*.—Mount Elgon and the Mau Plateau to the western side of the Rift Valley. This form is darker than any of the first five, and has the belly yellowish olive green lightly washed with grayish, the flanks with a tawny tinge, the yellow edges of the wings and tail much paler than in *bilineatus*. Wings (males) 56–59 millimeters.

7. *P. b. alius*.—The forest areas of the western Ukamba and the Kikuyu districts, west of the Rift Valley, Kenya Colony. Similar to *jacksoni* but smaller (wing 53–56 millimeters in the males) and darker below, more grayish on the throat and breast, less clear greenish yellow on the abdomen (more definitely tinged with grayish). Van Someren[48] writes that the western Kenian birds (*jacksoni*) have the rump darker, yellow chrome, while the eastern ones (*alius*) have this area canary yellow. This difference does not hold. It is purely a matter of individual variation.

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[45] Syst. Avium Ethiop., 1924, p. 283.

[47] Journ. f. Ornith., 1912, p. 523.

[48] Nov. Zool., vol. 29, 1922, p. 59.

The three specimens collected by the Frick expedition are in fairly fresh plumage, and measure as follows:

Male: Wing 54.5, tail 30.5, culmen 12.0, tarsus 15.0 millimeters. Female: wing 53.5–55.0, tail 31.0, culmen 12.0, tarsus 15.0–15.5 millimeters.

According to Van Someren[49] this barbet is a common bird in the open forests and plantations (rubber, bananas, etc.) in Kenya Colony, and nests at Nairobi. Unfortunately, no nesting dates are given, but the eggs are described as plain white. Grote says that on February 16 at Mikindani a native boy brought him a bird (*fischeri*) and an egg, which he claimed to have taken from a hole in a tree. The egg was very dark blue and very shiny. There can be no doubt but that Grote's informant was quite unreliable. No barbets are known to lay any but white eggs. Roberts[50] found a nest with three eggs at Myiai, west of Dar es Salaam, January 6, 1917. The eggs were pure white, rather glossy, and measured 18.3 by 12.2, 18.3 by 13.0, and 18 by 12.7 millimeters. He comments on Grote's record and decides, as I have, that the identification of the blue eggs must be wrong.

TRACHYPHONUS ERYTHROCEPHALUS JACKSONI Neumann

Trachyphonus erythrocephalus jacksoni NEUMANN, Journ. f. Ornith., 1928, p. 785: Wajheir, Kenya Colony.

Specimens collected:

Two males, near Gardula, Ethiopia, March 28, 1912.

One female, Gato River near Gardula, Ethiopia, April 18, 1912.

Two males, one female, Bodessa, Ethiopia, May 29–30, 1912.

One male, 3 females, Tertale, Ethiopia, June 7–10, 1912.

Four males, 1 female, Mar Mora, Ethiopia, June 14, 1912.

One male, immature, Endoto Mountains, South Kenya Colony, July 24, 1912.

One female, Tana River, Kenya Colony, August 14, 1912.

Soft parts (female): Bill, brownish red tipped with plumbeous black of which there is a light border to the lower edge of the maxillae; feet and claws, plumbeous olive.

Professor Neumann[51] has recently examined a long series (about 100 specimens) of this barbet and has recognized five subspecies, two of which are new at that point (*jacksoni* and *gallarum*). In studying the present species I have brought together the combined series of the United States National Museum, the Museum of Comparative Zoölogy, the American Museum of Natural History, and the Field Museum, and the conclusions arrived at completely substantiate and corroborate Neumann's work. The only change to be made is the northern limit of the range of *jacksoni*. Neumann states that this form occurs north to the Kenya-Ethiopia boundary, while the series collected by Mearns at or near Gardula, Bodessa, Tertale, and Mar Mora, extend the range into southern Shoa. They are the first specimens of *jacksoni* recorded from Ethiopia, and are not intermediate in nature between typical *jacksoni* and *gallarum*, but are practically identical with north Kenian material, slightly approaching *versicolor*, but agree fairly well with a topotype of *jacksoni*.

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[49] Ibis, 1916, p. 238.

[50] Ann. Trans. Mus., vol. 11, pt. 4. 1926, p. 234.

[51] Journ. f. Ornith., 1928, pp. 785–786.

The races recognized have the following ranges and characters.

1. *T. e. erythrocephalus.*—Northern Tanganyika Territory from the region of Lakes Manyara and Nguruman to the Kilimanjaro region, north to the Taru Desert, the Teita, Ukamba, and southern Kikuyu districts, Kenya Colony. Lake Naivasha is the westernmost locality from which I have seen typical *erythrocephalus*. This is the largest of all the races, wings 96–100 millimeters, and has a well defined black throat patch in the male, and the red of the cheeks and sides of the head continues around the hind edge of the occiput, completely surrounding the black crown patch in the males; the feathers of the crown in the females with small black tips.

2. *T. e. versicolor.*—Kenya Colony from Lakes Baringo and Hannington, north through Barsaloi to the south end of Lake Rudolf, west through eastern and northern Uganda to the country east of Gondokoro on the upper White Nile, and to Turkanaland. Somewhat smaller than the typical race, wings 91–96 millimeters, and with a great deal of yellow on the sides, top, and back of the head (also the superciliaries and forehead), but with the red completely surrounding the black crown patch, and with the under tail coverts yellow or orange red much mixed with yellow. Grant[52] and Van Someren[53] write that *versicolor* is not a valid form, and Sclater[54] follows their lead and rejects it as a synonym of *erythrocephalus*. However, as Neumann has shown, the form is perfectly valid, and I find it recognizable in specimens (4) from Lake Hannington and Barsaloi.

3. *T. e. jacksoni.*—From the Sabaki and Tana Rivers northwest through western Jubaland to the Rendili country east of Lake Rudolf, north to Gardula, in southern Shoa, where it intergrades with *versicolor*. This form is smaller than the nominate race, wings 89–96 millimeters (Neumann states 86–89 millimeters, but of 23 speci-

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[52] Ibis, 1915, p. 448.

[53] Nov. Zool., vol. 29, 1922, p. 60.

[54] Syst. Avium Ethiop., 1924, p. 285.

mens examined only 1 (a female) has a wing length of 89 millimeters, the rest being 91 millimeters or longer); the black throat patch and distribution of red on the occiput as in *erythrocephalus*, but with a wide band of yellow on the nape posterior to the red on the occiput.

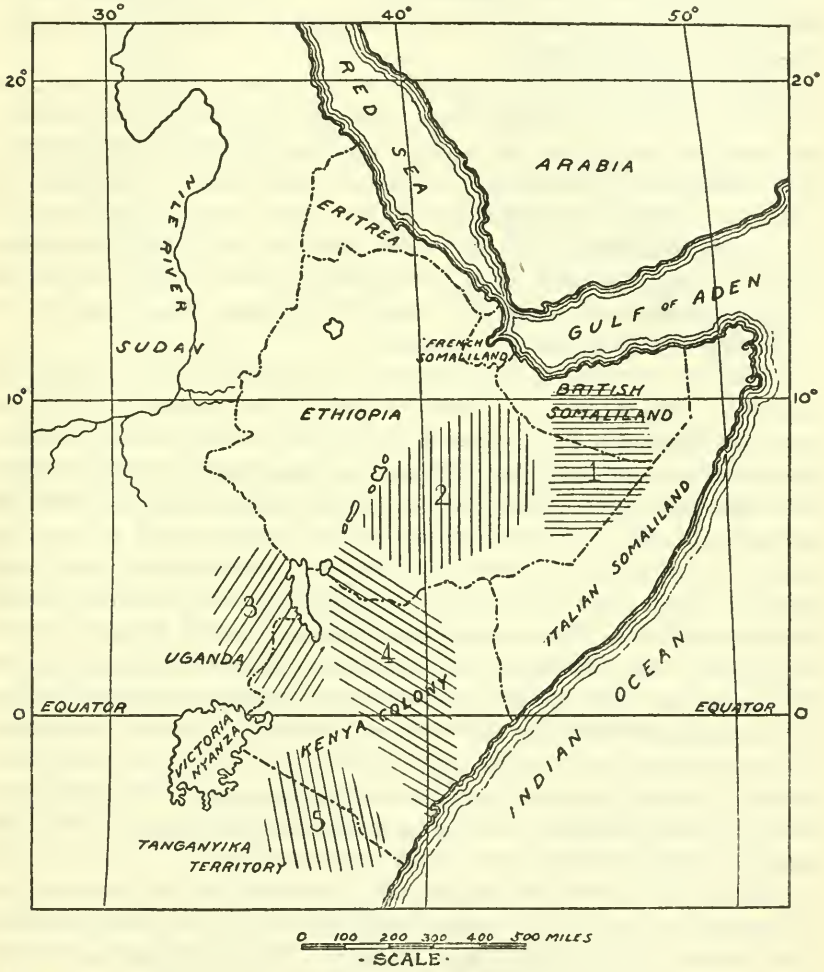

Figure 19.—Distribution of Trachyphonus erythrocephalus: 1, Trachyphonus erythrocephalus shelleyi; 2, Trachyphonus erythrocephalus gallarum; 3, Trachyphonus erythrocephalus versicolor; 4, Trachyphonus erythrocephalus jacksoni; 5, Trachyphonus erythrocephalus erythrocephalus

4. *T. e. gallarum.*—Ethiopia from the Harrar region southwest through Ennia and Arussi—Gallaland to Sagon and Gurraland. Slightly smaller than *jacksoni*, wings, 84–92 millimeters; the red color of the sides of the head not extending on the occiput and hence, not surrounding the black crown patch (which is bordered pos-

teriorly by yellow) in the males; the black throat patch wanting or poorly developed in the males; the crown feathers of the females very broadly tipped with black, being more black than reddish.

5. *T. e. shelleyi.*—Northern and eastern Somaliland from the Goolis Mountains to the Ogaden district of eastern Ethiopia and to Bera, Italian Somaliland. Similar in color to *shelleyi*, but smaller, wings, 77–81 millimeters.

Thus, to summarize the geographic variations of this barbet, we find it decreases in size from south to north (especially to northeast); the extent of the red on the back of the head in the males decreases from southwest to northeast (decreases on the sides and front of the head from south to northwest); and the black throat patch becomes less developed from south and southwest to north and northeast. Birds of the *versicolor* type occasionally occur in the ranges of *erythrocephalus* and *jacksoni*. One of the males from Gardula is of this type (with a yellow forehead).

Reichenow[55] writes that young males resemble adult females, but have the ocular region and anterior part of the cheeks pale yellow, the chin whitish, a gray spot on the middle of the throat, and the pectoral band composed not of black feathers but of reddish yellow or orange ones tipped with black. This all applies to young females, but not to males. A juvenal male (with only partly grown tail feathers) resembles the adult in having a black crown patch, but differs in lacking the throat streak. It agrees otherwise with juvenal females (which fit Reichenow's description), but in both sexes the gray spot on the middle of the throat is not visible in freshly feathered birds, as these grayish feathers are tipped with pale yellow, and it is not until the tips are worn off that the gray color is exposed. The postjuvenal molt begins on the breast, and the first noticeable change is in the pectoral band which then becomes wider, and composed of black feathers with white medio-terminal spots. The male from the Endoto Mountains is in this stage of molt.

The adults vary in the amount and intensity of the red color on the occiput and under tail coverts and also in the size of the terminal black spots on the yellow nape feathers. Their size variations are not great, but, because of the discrepancy in the dimensions of the present series and the figures given by Neumann for his specimens of *jacksoni* I append them here in tabular form. There is practically no difference between the sexes.

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[55] Vög. Afr., vol. 2, p. 155.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Near Gardula	♂	92. 0	84. 0	25. 5	27. 5
Do	♂	94. 0	84. 0	27. 0	28. 0
Bodessa	♂	91. 0	82. 5	23. 5	28. 0
Do	♂	96. 0	85. 0	23. 5	27. 0
Tertale	♂	94. 0	86. 5	24. 5	28. 0
Mar Mora	♂	93. 5	83. 0	24. 0	28. 0
Do	♂	93. 5	87. 5	26. 0	27. 0
Do	♂	92. 0	85. 0	24. 5	27. 0
Do	♂	96. 0	87. 0	25. 0	27. 5
Kenya Colony, Endoto Mountains, south	♂ [1]	96. 0	84. 0	------	28. 5
Ethiopia:					
Gato River	♀	95. 0	84. 0	23. 0	27. 0
Bodessa	♀	94. 0	84. 0	24. 0	27. 0
Tertale	♀	91. 5	84. 5	22. 5	28. 0
Do	♀	94. 0	85. 0	27. 0	28. 0
Do	♀	89. 0	84. 0	24. 0	25. 5
Mar Mora	♀	93. 0	86. 0	23. 5	26. 0
Kenya Colony, Tana River	♀	96. 0	88. 5	26. 5	29. 0

[1] Immature.

Of this series 6 birds (May 29 to July 24) are in worn plumage, 8 (March 28 to August 14) are in molt, and 3 (March 28 to June 14) are in fresh plumage. The caudal appears to precede the alar molt, and is irregular in the order in which the rectrices are dropped. The wing molt is more orderly, beginning with the innermost primary and outermost secondary.

According to Erlanger [56] the breeding season in Shoa is in March and April. This applies particularly to the race *gallarum* but is probably true of *jacksoni* as well, although the data on molts presented above would argue for a wider range of breeding season.

Besides the specimens collected, this barbet was observed as follows: West of Ithanga Hills, August 28, 10 seen; between the Athi River and Donio Sabuk, August 29, 10 seen; between Donio Sabuk and the Athi River near Juja farm, August 30, 4 birds; along a stream near the Athi River, August 31, 10 observed. These observations all refer to typical *erythrocephalus*.

TRACHYPHONUS MARGARITATUS SOMALICUS Zedlitz

Trachyphonus margaritatus somalicus ZEDLITZ, Orn. Monatsb., 1910, p. 57: Al Dubar, N. Somaliland.

Specimens collected:

One male, Ourso, Ethiopia, September 15, 1911.

Six males, 10 females, Dire Daoua, Ethiopia, September 9 to December 8, 1911.

One male, Chobi, Ethiopia, December 23, 1911.

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[56] Journ. f. Ornith., 1905, pp. 469–470.

The Ourso specimen and four of the Dire Daoua series were collected by H. and F. Von Zülow; one female from the latter place was taken by Cepharino, the rest by Doctor Mearns.

The yellow-breasted barbets have been divided into two races, as follows:

1. *T. m. margaritatus.*—The Khartoum and Sennar districts of the Anglo-Egyptian Sudan, Eritrea, Bogosland, northern and northwestern Ethiopia, west to Darfur, Lake Chad, Northern Nigeria, and to Asben. This race is large (wings, 89–100 millimeters in the males, 87–94 millimeters in the females) and has the abdomen yellowish, almost as bright as the breast and throat.

2. *T. m. somalicus.*—Northern Somaliland, west through Arussiland and Gallaland to Shoa where it intergrades with the typical form. The characters of this form are (1) small size (wings 83–91 millimeters in both sexes), and (2) the abdomen with but little yellow, much grayer and whiter than the breast and throat.

Both these races are valid and are upheld by the material studied. Zedlitz [57] has indicated that the color of the back has no taxonomic or geographic significance, but is merely a matter of individual variation. Some birds have the ground color of the wings, mantle, and upper back dull grayish brown while in others it is much darker—brownish fuscous. I have seen no specimens in which the brown is replaced by black, but Elliot [58] recorded such to be the case in some Somaliland specimens. Erlanger [59] cites Elliot's observations only to refute them with his more recent specimens. The present series (with seven others, making 25 in all) shows two things with regard to the intensity of the dorsal body coloration. First, there is considerable individual variation. Second, the juvenal plumage is lighter, more grayish brown, the adult feathers darker, more fuscous brown. Several molting birds in the series collected at Dire Daoua have the two shades of brown present, and in every case the light colored feathers are old and worn, the dark ones new and fresh. Add to the matter of age, the factors of abrasion and fading, and all the observable differences are accounted for.

The size variations are presented in the following table:

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[57] Journ. f. Ornith., 1910, pp. 740–752.

[58] Field Col. Mus., vol. 1, p. 2; 1897, p. 49.

[59] Journ. f. Ornith., 1905, p. 470.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Ourso	♂	87	77. 0	23. 5	25. 5
Chobi	♂	89	83. 0	24. 0	26. 5
Dire Daoua	♂	84	80. 0	23. 0	25. 0
Do	♂	88	81. 0	24. 0	26. 0
Do	♂	90	84. 0	23. 0	24. 5
Do	♂	86	83. 0	22. 0	25. 5
Do	♂	91	85. 5	24. 0	26. 0
Do	♂	91	83. 0	24. 5	25. 5
Do	♀	86	81. 5	22. 0	26. 0
Do	♀	86	82. 0	22. 0	25. 0
Do	♀	84	82. 0	22. 0	26. 0
Do	♀	88	82. 0	23. 0	25. 5
Do	♀	88	78. 0	23. 0	24. 0
Do	♀	89	86. 0	23. 0	26. 5
Do	♀	83	80. 0	23. 0	24. 5
Do	♀	85	79. 0	21. 5	24. 5
Do	♀	86	78. 5	23. 0	24. 5
Do	♀	87	80. 0	21. 0	26. 0

The juvenal plumage is similar to that of the adult, but the brown of the back and wings is paler, and the feathers of the back lack the white spots present in older birds. The postjuvenal molt appears (from rather inadequate material) to be incomplete, the old rectrices and remiges being retained.

The molts of this barbet are puzzling, and observations on more material, living as well as preserved, are necessary to clarify the subject. The wing molt begins at the carpal joint and advances proximally more rapidly than it does distally, so that the innermost secondary is renewed when the four outermost primaries are still to be shed and replaced. The caudal molt is so irregular in the material examined that I can not put the individual observations together in any logical sequence. Thus, one specimen has shed and is replacing the middle and the next to the outermost pairs of rectrices simultaneously and all the rest of the tail feathers are old. Another individual has all but the middle pair new, the next to the middle pair only half grown, the middle rectrices old, suggesting a centripetal tail molt. Opposed to this, another specimen has the middle three pairs newer than the outer ones, indicating a centrifugal molt.

This barbet inhabits the rich vegetation along stream banks in northern Somaliland, but in the highlands of northern Ethiopia, Zedlitz found the typical race to be in no sense a true forest bird, but rather one of the thornbush and even of the less densely wooded steppe country. In the Sudan and the Lake Chad country the typical race is said to nest in holes in the ground.

TRACHYPHONUS DARNAUDII BÖHMI Fischer and Reichenow

Trachyphonus böhmi Fischer and Reichenow, Journ. f. Ornith., 1884, p. 179: Barawa, Juba River.

Specimens collected:

One male, 18 miles southwest of Hor, Kenya Colony, July 1. 1912.

One male, Nyiro Mountains, Indunumara Mountains, Kenya Colony, July 13, 1912.

Two females, Endoto Mountains, Kenya Colony, July 20–22, 1912.

One male, Tharaka district, Kenya Colony, August 14, 1912.

Two males, one female, Tana River, camp No. 3, Kenya Colony, August 16, 1912.

T. darnaudii breaks up into four currently recognized races, while a fifth (*zedlitzi*) is recognized by some authors and not by others. Twenty examples of all four races have been examined.

1. *T. d. darnaudii.*—Sclater [60] gives the range of this race as Kordofan, upper White Nile, and Shoa to the Rift Valley in Kenya Colony. Zedlitz,[61] on the other hand, writes "N.- und W.- Abessinien." Inasmuch as specimens are known from northwestern Ethiopia as well as from the adjacent parts of the Sudan, the range as far as known at present should read: Kordofan, east to northwestern Ethiopia, south through the basin of the upper White Nile, western Ethiopia and Shoa to the western border of the Rift Valley in Kenya, as far as Nyarondo and Lake Baringo, in Kenya Colony, and Nile Province, Masindi, Moroto, and Kerio, in Uganda.

Berger [62] separated the birds of the Lake Baringo region under the name *zedlitzi.* The characters on which this race was based are (1) slightly larger size (2) more strongly developed red on the head, and (3) smaller, less noticeable black throat spot than in *darnaudii.* Zedlitz [61] recognizes this form, but Van Someren [63] writes that the variation is so extensive as to make it difficult to say whether *zedlitzi* is really distinct. Sclater [60] considers it a synonym of *darnaudii.* Claude Grant [64] apparently overlooked *zedlitzi* entirely. I have put the above on record to show that published opinions as to merits of *zedlitzi* are far from uniform. We may now produce some other evidence in favor of this race. Erlanger [65] in discussing the race *böhmi,* writes that young birds have the black throat spot smaller than in adults, sometimes only slightly developed. Red tips to the feathers of the throat and breast are signs of old birds in nuptial plumage. Now, if we examine the criteria given by Berger, or by Zedlitz, we find that the birds are said to combine features, which in *darnaudii*, are immature and breeding adult plumage characters. Obviously, individual specimens from Lake Baringo can not be young and old at the same time, and it therefore appears that there may be something to the color characters and hence, to the race having them. However, until I have an opportunity of examining Lake Baringo material, I prefer to follow Sclater's list as a matter of policy.

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[60] Syst. Avium Ethiop., 1924, p. 286.

[61] Journ. f. Ornith., 1915, p. 17.

[62] Idem, 1911, p. 512.

[63] Nov. Zool., vol. 29, 1922, pp. 60–61.

[64] Ibis. 1915, pp. 450–451.

[65] Journ. f. Ornith., 1905, pp. 470–471.

2. *T. d. usambiro.*—From the Southern Guaso Nyiro and the Loita Plains, Kenya Colony, south to the regions south and southwest of Lake Victoria, Tanganyika Territory (east to the Wemberre Steppes). This race is similar to the nominate form but larger (wings 81–87 as against 63–77 millimeters in *darnaudii*).

3. *T. d. böhmi.*—From southern Italian Somaliland, through eastern Jubaland and eastern Kenya Colony west to the eastern side of the Rift Valley (one record from northwest of Mount Kenia, see Van Someren), south to northeastern Tanganyika Territory (Paré Hills, Kilimanjaro, Nguru Mountain, Arusha, etc.). This form is very distinct in coloration, having the crown solid black, instead of yellow barred or spotted with black, and has a large black throat patch. In size it is nearer to *darnaudii* than to *usambiro;* wings 72–80 millimeters. This race is considered a distinct species by some workers, and it may well be. If it should be found breeding northwest of Mount Kenia, where *darnaudii* (or *zedlitzi*) probably occurs, then it would have to be granted specific rank.

4. *T. d. emini.*—Tanganyika Territory, from the Mpapwa, and Ugogo districts, south through the Dodoma, Iringa, and Uhehe country to the north end of Lake Nyasa. This race has the top of the head black as in *böhmi* but differs from it in having a broad black band extending from the chin posteriorly over the entire length of the throat. It is also somewhat darker on the back. If *böhmi* be considered specifically distinct from *darnaudii*, then *emini* should be placed as a race of *böhmi*, not of *darnaudii* as Sclater has done. Van Someren[63] showed that Claude Grant[66] was mistaken when he figured *emini* as the female of *darnaudii*.

The present series of *böhmi* varies chiefly in the amount and intensity of the yellow on the upper abdomen and the amount of orange tinge on the posterior portion of the superciliaries. The size variations are as follows:

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[63] Nov. Zool., vol. 29, 1922, pp. 60–61.

[66] Ibis, 1915, pl. 5.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Kenya Colony:					
18 miles southwest of Hor	♂	80. 0	84. 0	18. 5	24. 5
Indunumara Mountains	♂	75. 0	77. 0	17. 0	21. 0
Tharaka district	♂	73. 0	77. 5	16. 0	21. 5
Tana River	♂	73. 0	73. 0	18. 0	23. 0
Do	♂	74. 5	76. 5	17. 5	23. 5
Do	♀	73. 0	74. 5	16. 0	23. 0
Endoto Mountains	♀	72. 0	71. 0	18. 0	24. 0
Do	♀	75. 0	74. 0	17. 0	22. 5

Three of the specimens are in molting condition, the tails being chiefly affected. The caudal molt is centripetal. However, in four molting examples of *usambiro*, the caudal molt, while apparently centripetal in three individuals, is very peculiar in the fourth. In this bird the middle and the outermost pairs of rectrices are new, and still basally enclosed in their sheaths, while the rest are old.

Besides the actual specimens collected, this barbet was recorded as follows: At a spring in the Indunumara Mountains, July 14–18, 6 seen; plains at base of the Endoto Mountains, July 19–20, 10 seen; Endoto Mountains, July 21–24, 25 (including 2 collected); on the march to Er-re-re, July 25, 20 seen; between Er-re-re and Le-se-dun, July 26, 20 noted; between Le-se-dun and Malele, July 27, 10; between Malele and the Northern Guaso Nyiro, July 28–31, 18 seen; between the Tharaka district and the Tana River, August 13–17, 64 noted.

Family INDICATORIDAE

INDICATOR INDICATOR (Sparrman)

Cuculus indicator Sparrman, Philos. Trans., vol. 67, p. 43, pl. 1, 1777: Great Fish River, near Somerset East, Cape Province.

Specimens collected:

Female adult, Hawash River, Ethiopia, February 10, 1912.

Male adult, Lake Abaya, southeast Ethiopia, March 21, 1912.

Male, immature, Black Lake Abaya, Ethiopia, March 25, 1912.

Male adult, female immature, Gato River near Gardula, Ethiopia, April 9–14, 1912.

Male, immature, Bodessa, Ethiopia, June 1, 1912.

Male adult, Tana River, camp No. 6, Kenya Colony, August 22, 1912.

Female, immature, Tana River at mouth of Thika River, Kenya Colony, August 24, 1912.

Female adult, 20 miles from mouth of Thika River, Kenya Colony, August 27, 1912.

Female adult, Bowlder Hill, Thika River, Kenya Colony, August 28, 1912.

Female adult, between Thika and Athi Rivers, Kenya Colony, August 29, 1912.

Soft parts: Male adult; bare skin around eye neutral tint; iris brown; bill all purplish flesh color; feet plumbeous; claws black.

As is now well known, the yellow-throated birds (described as *I. major*) are the immature of the present species. I have examined a series of 50 specimens of this honey guide from South Africa, Tanganyika Territory, Kenya Colony, Belgian Congo, the Sudan, and Ethiopia and conclude (as others have done before) that no geographic races are recognizable. The birds vary considerably in size, but the variations are purely individual. Males are larger than females; wings 110–117 in the males, 96–108 millimeters in the females; tail 70–76.5 as against 62–68 millimeters; culmen 13–15.5 as against 11–13 millimeters.

The four immature birds are in the middle of the postjuvenal molt. The two males present a rather bizarre appearance with their black and yellowish-white checkerboard throats. The postjuvenal molt is incomplete, as it does not affect the remiges and rectrices. The margins of the old upper wing coverts, scapulars, and interscapulars become extremely faded by the time the postjuvenal molt begins, being much tawnier, more sandy, less olivaceous than when fresh. The molt appears to begin rather irregularly in the scapular and interscapular tracts, then starts on the chin and throat and the upper wing and tail coverts. The juvenal median upper tail coverts have not dusky shaft stripes and may thereby be distinguished from the adult feathers. These feathers are all replaced and full grown long before the upper wing coverts are through with the molting process. The last parts to molt are the forehead and crown.

The first adult plumage is worn but a short time when the old (juvenal) remiges and rectrices are replaced. The wing molt slightly antecedes the caudal ecdysis and appears to have but one center of origin, the carpal joint.

It is decidedly unusual to find a bird in which the juvenal plumage is so totally different from that of the parents of either sex, and this a plumage which is in no way indicative of any phylogenetic significance. It is little wonder that the yellow-breasted birds were long considered a distinct species.

Mearns recorded the note of this honey guide as *weak-tea, weak-tea.* Besides the specimens procured, he observed the species as follows: South of Lake Abaya, March 26–29, 1 bird; Gato River near Gardula, March 29 to May 17, 20 seen; Anole Village, Sagon River, and Bodessa, May 19 to June 3, 4 noted; Tana River, August 15, 1; Tana River at mouth of Thika River, August 23–26, 4 seen; Thika River, August 27, 10 birds; west of the Ithanga Hills, August 28, 4; Athi River to Donio Sabuk, August 29, 10 individuals; Juja Farm, Athi River, August 30, 4 birds; stream near the Athi River, August 31, 2 seen.

The black-throated honey-guide ranges from sea level to altitudes of as much as 8,000 feet (2,400 meters) on Mount Elgon (see Granvik).[67] On Kilimanjaro, Sjöstedt records it only up to 1,900 meters (approximately 6,000 feet). I know of no record of this bird high up on Mount Kenia or on Ruwenzori, a thing which suggests that the encircling band of forest around the lower parts of these mountains acts as a barrier to the bird, which is characteristically a thornbush country form. Zedlitz[68] writes that in Eritrea and northern Ethiopia this bird occurs in the wooded areas (probably not true, dense forests). It is very common in the Tacazzé area in the thorny thickets of Adiaboland, and also occurs in the eastern escarpment of the Ethiopian plateau, but not commonly.

It is parasitic in its breeding habits, victimizing barbets and starlings. According to Erlanger[69] the breeding season in Ethiopia is from January to April.

INDICATOR VARIEGATUS VARIEGATUS Lesson

Indicator variegatus Lesson, Traité p. 155, 1831: Africa.

Specimens collected:

Three females, Gato River near Gardula, Ethiopia, April 11–24, 1912.

With the limited series available for study I can not do better than to follow Sclater's arrangement of the scaly-throated honey-guides.[70] However, it seems that the birds of southern Ethiopia and northern Kenya Colony are not always typical *variegatus* but sometimes produce intermediates between that form and *jubaensis*. The present birds, however, are not intermediate. When Neumann described the latter form[71] he compared southern Somaliland birds with a series from Ethiopia as well as from South and East Africa, so it would appear that in his opinion Ethiopian birds are of the nominate form, and the small *jubaensis* (wings 97–103 millimeters as against 105–114 millimeters in *variegatus*) is restricted to southern Italian Somaliland. I have seen two male specimens from the Tana River (one from latitude 0° 12′ south, longitude 38° 11′ east, the other, latitude 0° 25′ south, longitude 38° 0′ east, both in the Museum of Comparative Zoölogy) which have wing lengths of 100 and 102.5 millimeters, respectively, and which I therefore consider *jubaensis*. The ranges of the two races as I see them in the material examined are as follows:

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[67] Journ. f. Ornith., 1923, Sonderheft, p. 83.

[68] Idem, 1910, p. 744.

[69] Idem, 1905, p. 467.

[70] Syst. Avium Ethiop., 1924, pp. 287–288.

[71] Bull. Brit. Orn. Cl., vol. 21, 1908, p. 97: Jonte, near Kismayu.

1. *I. v. variegatus*.—A narrow strip along the Shoan lakes from Wonda (south of Adis Abeba) southwest to Uba, Gofa, Gardula, etc., southwest through Turkanaland to northeastern Uganda (Mount Moroto) through Uganda west to the Budongo, Toro, and Masaka districts and Bukoba, to Lake Kivu, east across Kenya Colony to Mount Kenia and southeast to Mombasa, south through Tanganyika Territory, Nyasaland, the Katanga, Angola, and Mashonaland to the Cape Province.

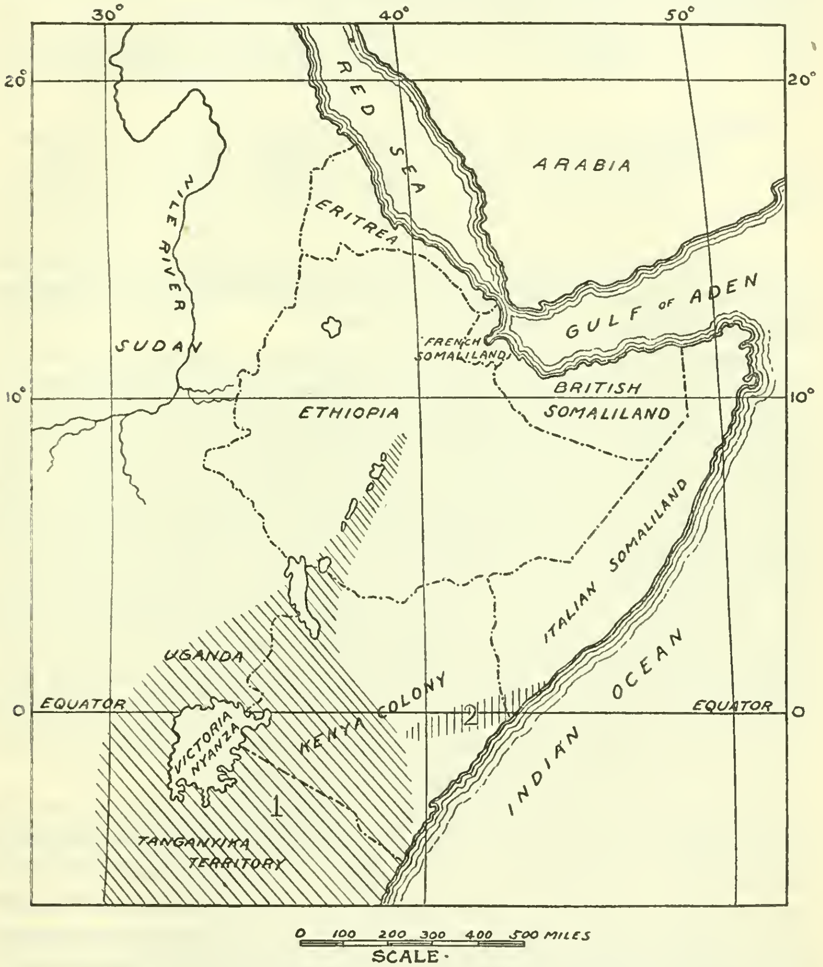

FIGURE 20.—DISTRIBUTION OF INDICATOR VARIEGATUS IN NORTHEASTERN AFRICA: 1, INDICATOR VARIEGATUS VARIEGATUS; 2, INDICATOR VARIEGATUS JUBAENSIS

2. *I. v. jubaensis.*—A rather narrow area from southern Italian Somaliland across Jubaland to the Tana River at approximately 38° east longitude. Intergrading to a slight extent with the typical form west of 38° east longitude and north to the southern Shoan lakes.

In support of my contention that the present specimens are not intermediate I append their size measurements.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Gato River	♀	103. 5	65	12	15. 0
Do	♀	103. 0	63	13	15. 0
Do	♀	105. 0	67	12	15. 5

All three are molting the wings, but I doubt if this is responsible for the small measurements, as the longest primaries are full grown. Males are larger than females as a rule.

The total series examined, while small, shows considerable individual variation in the abundance and extent of the dusky streaks on the underparts. This is borne out by Van Someren's observations [72] that while some of the birds in his collection are heavily speckled on the breast others have almost uniform underparts. There is also some variation in the markings themselves; some birds are streaked whereas others are more spotted—that is the marks are wider and more terminal, less median, in their position on the individual feathers. Reichenow [73] writes that young birds have the throat streaked with dark gray; the adults, spotted with blackish. On the other hand, Ogilvie-Grant [74] is equally definite in his statement the birds with spots are immature; those with streaks, fully adult. The matter is thus left unsettled and will continue to be so until observations on molting birds are made, preferably on living ones.

All three birds brought back by the Frick expedition have the forehead and crown as well as the occiput, nape, and interscapulars, washed with olivaceous, and the feathers of the forehead and crown are laterally edged with yellowish white. Zedlitz [75] notes the same for the three Ethiopian birds he examined. As already mentioned, these birds are replacing the remiges, but there is no sign of a caudal molt. The wing molt begins at the wrist joint and extends in both directions.

The scaly-throated honey-guide is somewhat of a forest bird and is thereby usually ecologically isolated from its congener *I. indicator*, and is also, consequently, much more local in its range than the latter. Occasionally the two species are found together as on Mount Elgon, where Granvik[76] procured both in the same locality. The altitudinal range of *I. variegatus* is from sea level to 7,000 feet. In Ethiopia it is decidedly uncommon, and, as far as I know, has been taken but few times. The first records for that country were two females taken by Neumann[77] at Senti Valley between Uba and Gofa; the second, Erlanger's example from Wonda (the northernmost record), and now, the three taken by Mearns near Gardula. I know of no other Ethiopian specimens.

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[72] Nov. Zool., vol. 29, 1922, p. 53.

[73] Vög. Afr., vol. 2, p. 108.

[74] Ibis, 1908, p. 309.

[75] Journ. f. Ornith., 1915, p. 9.

INDICATOR VARIEGATUS JUBAENSIS Neumann

Indicator variegatus jubaensis NEUMANN, Bull. Brit. Orn. Cl., vol. 21, 1908, p. 97: Jonte, near Kismayu, Juba River.

Specimens collected:

Male adult, Tana River, 1,200 feet (360 meters), Kenya Colony, August 15, 1912.

As already outlined under the typical race, the birds of the Tana River west at least to the 38th meridian east longitude are *jubaensis*, not *variegatus*. It is unfortunate that all previous writers have given measurements without any indication of the sex of the birds measured, merely because the two sexes look alike. There is, however, considerable difference, the wing length of the males being about 8 millimeters greater (on the average) than that of the females. The present specimen has a wing 103.5 millimeters long, tail 64, and tarsus 15.5 millimeters. The bill is broken and can not be measured.

This race has not been previously recorded from Kenya Colony, although as long ago as 1915, F. R. Wulsin collected two males on the Tana River which are definitely *jubaensis*.

INDICATOR MINOR ERLANGERI Zedlitz

Indicator exilis erlangeri ZEDLITZ, Orn. Monatsb., 1913, p. 59: Afgoi, southern Somaliland.

Specimens collected:

One unsexed, Gato River near Gardula, Ethiopia, April 15, 1912.

One female, Tana River at mouth of Thika River, Kenya Colony, August 26, 1912.

It should be said at the outset that the identification of these two specimens is somewhat uncertain. I have not seen sufficient material to form any idea of even specific, to say nothing of racial, characters, in the small forms of *Indicator* commonly referred to three "species,"

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[76] Journ. f. Ornith., 1923, Sonderheft, p. 84.

[77] Idem, 1904, p. 383.

minor, *exilis*, and *conirostris*. After careful study of the various attempts at revisions of these puzzling birds [78] I am forced to the conclusion that their respective authors had no uniformity of opinion, and when all are taken together the result is merely a chaos of contradictions. Apparently no one has had sufficient material with adequate data (age, sex, etc.) to get very far in this study. It is unfortunate that none of the reviewers even hint as to what they consider the characters of the species they recognize.

The specimen from near Gardula is somewhat darker below than the one from the Tana River, and it may be intermediate between *erlangeri* and *diadematus*. If these birds are *erlangeri* they constitute the first records for that race in Ethiopia and Kenya Colony. In the Museum of Comparative Zoölogy there is a specimen of *Indicator minor* which I refer to *teitensis*, but it is rather small for that form and is probably an intergrade between it and *erlangeri*. It has a wing length of 82 millimeters (female). The present two individuals measure as follows: Gato River bird, wing 85.0, tail 53, culmen 10.5, and tarsus 14.5 millimeters; Tana River, wing 80.0, tail 51, culmen 10, and tarsus 14.0 millimeters.

In the present state of knowledge, the less said about these birds the better.

In addition to the two specimens taken, Mearns noted a few "small Indicators" at Loco, Gidabo River, Black Lake Abaya, and near Gardula, March 15 to May 17.

PRODOTISCUS REGULUS PEASEI Ogilvie-Grant

Prodotiscus peasei OGILVIE-GRANT, Bull. Brit. Orn. Cl., vol. 11, p. 67, 1901: Unji, Ethiopia.

Specimens collected:

Male, Gato River near Gardula, Ethiopia, April 20, 1912.

This specimen, which appears to be the third one known, agrees with the description and with the plate in Erlanger's report.[79] Inasmuch as the only comparative material available is a series of five birds from Natal (typical *regulus*) I can not get very far in interpreting the case of *peasei* but I am very doubtful of its validity. It looks too much like a mere aberrant *regulus*, and its scarcity suggests the infrequency of the aberration rather than the extreme rarity of the bird in the region of the Shoan lakes. The type came from Unji near the north end of Lake Zwai, the present bird from

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[78] Oberholser, Proc. U. S. Nat. Mus., vol. 28, 1905, pp. 868–874; Zedlitz, Journ. f. Ornith., vol. 63, 1915, pp. 7–15; C. Grant, Ibis, 1915, pp. 431–436; Sclater, Syst. Avium Ethiop., 1924, pp. 288–290; Van Someren, Nov. Zool., vol. 29, 1922, pp. 53–54.

[79] Journ. f. Ornith., 1905, pl. 14, figs. 2 and 2*a*.

Gardula, south of Lake Abaya. The two localities are approximately 200 miles apart in a line running almost due northeast.

The other specimen, taken by Erlanger at Daroli River near Ginir, Arussi-Gallaland, is the easternmost of the three. If *peasei* be a good race (and I recognize it merely to conform with Sclater's list until I can prove that it is not), the distribution of the two eastern forms would be as follows:

1. *P. r. regulus.*—Natal, Mozambique, Rhodesia, Angola, north through east Africa to the Anglo-Egyptian Sudan, and the eastern part of the Hawash basin in Ethiopia.
2. *P. r. peasei.*—The Shoan lakes area from Gardula north to Unji and east to the Daroli River in Arussi-Gallaland.

The western, Cameroon race, *camerunensis*, I have not seen, and, at any rate, it need not concern us here.

Further evidence against the validity of *peasei* is given by Claude Grant[80] who writes that—

> * * * The series in the British Museum collection shows that some variation occurs in the markings of the tail, some specimens having pure white under [outer] tail feathers, others having broad tips and even having the dark color running up the edge of the inner webs, these variations being found in the same locality.
>
> It would therefore appear that one of the characters given by Mr. Ogilvie-Grant for his *Prodotiscus peasii* * * * is of little or no value, and the central tail feathers are not lighter than some specimens of *P. regulus;* but as the wing measures in the single type specimen 83 millimeters as against 80 to 75 millimeters in *P. regulus*, *P. peasii* may prove to be a somewhat larger race confined to northeast Africa.

The specimen obtained by Mearns is intermediate in size, its measurements being, wing 81.5, tail 54, culmen 11.5, and tarsus 12 millimeters. Five males from Natal (H. Friedmann collection) have wings from 78 to 81 millimeters in length. It may be that *peasei* is valid, but I feel that its validity depends chiefly on the absence of adequate series.

The figure of *peasei* given by Ogilvie-Grant[81] is too dark on the upper parts (at least when compared with the present specimen, which is less dusky), and slightly too grayish on the tail.

The only field notes on the bird are the meagre ones of its original discoverer, Alfred E. Pease,[82] who merely says that this honey guide was only seen but once, in very dense thorn jungle.

Nothing is known of the breeding habits of any form of *Prodotiscus*. In South Africa, *regulus* is migratory; whether *peasei* is also is an open question.

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[80] Ibis, 1915, pp. 436–437.

[81] Idem, 1901, pl. 13.

[82] Idem, 1901, p. 667.

Family PICIDAE

CAMPETHERA TAENIOLAEMA HAUSBURGI Sharpe

Campothera hausburgi SHARPE, Bull. Brit. Orn. Cl., vol. 10, 1900, p. 36: Mt. Kenia.

Specimens collected:

Male, Escarpment, Kenya Colony, September 6, 1912.

Although this race is not listed by Sclater [83] it is nevertheless a valid form. Van Someren [84] has reviewed the races of this woodpecker, and the limited material available for study in the present connection supports his conclusions. The races are as follows:

1. *C. t. taeniolaema.*—Uganda, and Kenya Colony from Mount Elgon and Kakamegoes east to the western ridge of the Rift Valley (Mau, Sotik, Elgeyu, etc.). Characters: Underparts whitish barred with green, faintly washed with greenish; upper parts dull green.

2. *C. t. hausburgi.*—Kenya Colony, in and east of the Rift Valley to as far as Mount Kenia, Fort Hall, and Nairobi. Nakuru birds are typical *hausburgi*, but according to Van Someren the two races intergrade on the eastern slope of the western escarpment of the Rift Valley at Molo. Characters: Underparts similar to *taeniolaema* but with a yellowish wash; the barring on the cheeks and throat finer, and the upper parts brighter green, more yellowish-green, than the typical race.

Granvik [85] collected an adult female at Ngong, near Nairobi, which, together with several birds from Mount Elgon, he referred to *C. taeniolaema.* He writes that, " * * * if *C. t. hausburgi* Sharpe is a good species (which seems very doubtful to me) and not an immature form I could almost place my specimen from Ngong under it, as the banding on the flanks and underparts are distinctly narrower and paler than in those from Elgon * * *." In other words, he finds that the characters of *hausburgi* hold, but for some unknown reason still believes them to be those of immaturity although his bird is an adult.

3. *C. t. barakae.*—The country northwest of Lake Tanganyika, the Kivu district, Ruanda, and extreme western Uganda (Mpanga forest in Toro). The characters are said to be as follows: [86] Not as yellowish-green above as in *hausburgi*, but the throat and breast more decidedly barred with dark blackish green, and darker green on the abdomen. I have seen no material of *barakae*, but both Sclater and Van Someren agree in recognizing its validity.

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[83] Syst. Avium Ethiop., 1924, p. 294.

[84] Nov. Zool., vol. 29, 1922, pp. 65–66.

[85] Journ. f. Ornith., 1923, Sonderheft, p. 93.

[86] See Van Someren, Bull. Brit. Orn. Cl., vol. 40, p. 96, 1920.

The measurements of four specimens of *hausburgi* examined are: Males, wing 105–107, tail 66–68, and culmen 24 millimeters; females, wing 106–106.5, tail 66–67.5, and culmen 22–22.5 millimeters.

This woodpecker is a bird of the highland forests of the inner parts of east Africa, at altitudes of from 4,000 to 7,000 feet (1,200 to 2,100 meters). It apparently does not occur on Mount Kilimanjaro, and has not been taken on Ruwenzori although found near by in the Mpanga forest.

CAMPETHERA NUBICA NUBICA (Boddaert)

Picus nubica Boddaert, Table Pl. Enlum., p. 41, 1783: Nubia (from Pl. Enlum. No. 667).

Specimens collected:

Three male adults, four female adults, Dire Daoua, Ethiopia, December 6–20, 1911.

One female adult, Sadi Malka, Ethiopia, December 21, 1911.

One male adult, Hawash River, Ethiopia, February 10, 1912.

One male adult, one female adult, Aletta, Ethiopia, March 11, 1912.

One female adult, Loco, Ethiopia, March 15, 1912.

Three male adults, six female adults, Gato River near Gardula, Ethiopia, April 11 to May 11, 1912.

One male adult, Lake Stefanie, Ethiopia, May 17, 1912.

Two female adults, Sagon River, Ethiopia, June 3–4, 1912.

One male adult, Endoto Mountains, south Kenya Colony, July 24, 1912.

One female adult, Er-re-re, Kenya Colony, July 25, 1912.

Soft parts (female): Iris, reddish brown; bill and claws, dusky plumbeous; feet, greenish gray.

The literature of this woodpecker is rather confusing due to the divergent results arrived at by different revisers, and consequently it seemed worth while to investigate the variations, geographic and otherwise, of this bird in spite of the fact that the ground was by no means new. All in all I have examined 73 specimens from the following countries: Ethiopia, Kenya Colony, Uganda, Anglo-Egyptian Sudan, Belgian Congo, Ruanda, and Tanganyika Territory. Before presenting the conclusions it is desirable to review the opinions of previous investigators in order to visualize the problem more clearly.

Reichenow[87] described a woodpecker, which he called *Dendromus neumanni*, which was very similar to *Campethera* (then *Dendromus*) *nubica* but different in having the upper parts darker and more greenish with only small and few whitish marks; darker cheeks and malar region, less whitish, more blackish; underparts abundantly flecked, the spots extending on to the belly. This bird was said to inhabit the Kikuyu and Ukamba regions of southern Kenya Colony. Six years later Sharpe[88] described another form, *pallida*, differing from *nubicus* in its much lighter, paler color, and in the "* * * complete and regular banding of back and wings * * *."

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[87] Orn. Monatsb., 1896, p. 132: Naivasha, Kenya Colony.

Reichenow[89] then decided that both *neumanni* and *pallida* were races of *nubica* and that *niger* Neumann[90] was a distinct species. Lest this discussion become needlessly involved, it may be said here that *niger* is a straight synonym of *nubica*, a point that has been fairly well settled and agreed upon for some time. We have here, then, three races of *Campethera nubica.* The subsequent literature concerns itself mainly with the problem of testing the validity and delineating the ranges of these races. It is true that Neumann[91] wrote definitely that *neumanni* was not a race of *nubica* but a distinct species as he had collected both at Kwa Kitoto in the Kavirondo country on the eastern shores of Lake Victoria. We shall come back to this statement in a little while, and may turn our attention to the main discussion of *C. nubica.* Erlanger[92] collected some 50 specimens of the Nubian woodpecker (in Ethiopia and Somaliland) and showed, for the first time, that the differences between *nubica* and *neumanni* could be accounted for by age, the latter being similar to the young of the former, and also cast some doubt on the validity of *pallida* by suggesting that that race was merely *nubica* in very fresh plumage, before any of the light margins had worn off. He also worked out the sequence of plumages in this woodpecker, and in a colored plate (pl. 12) showed the various stages and transitions. This last part of his work is sound and is entirely substantiated and corroborated by the series examined in the present study.

Five years later Zedlitz[93] raised the question as to whether *scriptoricauda* Reichenow[94] might not also be a race of *nubica.* Aside from this, his chief contribution to the subject is his summation of color variation in this species—the higher in the mountains, the darker the birds; the lower in the steppes, the lighter the specimens. But, he cautions, this has no bearing on geographic subspecies.

C. H. B. Grant[95] concluded after an examination of over a hundred specimens that *pallida* was a valid form, that *niger* and *neumanni* were synonyms of *nubica*, and that the then recently described *albifacies* of Gunning and Roberts[96] was a recognizable race of this species. He considers *scriptoricauda* a synonym of *nubica* in spite of the fact that the former has the chin and throat abundantly spotted with black, while the latter has these parts immaculate. By this time (1915) Zedlitz[97] and others who had previously questioned the validity of *pallida* were convinced of its validity, and we may, therefore, no longer concern ourselves with that race. We have left, then, *nubica* (with *neumanni* and *scriptoricauda* as synonyms or distinct races) and *albifacies*. Van Someren[98] found that *scriptoricauda* (characterized by having spots on the chin and throat, and by having the mandible yellow, not dusky as in *nubica*) occurred together with *pallida* over a large area without intergrading, and could not therefore be looked upon as conspecific with the latter. He accordingly, and correctly, in my opinion, raised the former to specific rank. The southern *albifacies* he considered a race of *scriptoricauda*. However, he concluded that *neumanni* was a valid form of *nubica* and so reopened that angle of the problem. His remarks are instructive and may be quoted at this point.

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[88] Ibis, 1902, p. 638: Lamu.
[89] Vög. Afr., vol. 2, pp. 178–179.
[90] Orn. Monatsb., 1902, p. 9: Kaffa.
[91] Journ. f. Ornith., 1904, pp. 394–395.
[92] Idem, 1905, pp. 475–477.
[93] Idem, 1910, pp. 752–753.
[94] Orn. Monatsb., 1896, p. 131; interior of Tanganyika Territory.
[95] Ibis, 1915, pp. 451–453.
[96] Ann. Transv. Mus., vol. 3. p. 112, 1911: Villa Periera, Borer.

> In a variable species such as this it is difficult to define races. There are, however, certain characters by which, in large series, one can admit * * * races * * *. When a series of birds from Abyssinia, Somaliland, Sudan, Uganda, and East Africa is laid out, it will be noticed that those taken in East Africa from Kavirondo south to Nairobi are dark birds, this being due to the fact that the great majority are spotted on the back, not barred or with spear-shaped spots. The northern birds I place as *C. nubica nubica*, those of East Africa, within certain limits, as *C. nubica neumanni* * * *.

It is unfortunate that he does not refer to Erlanger's work, as it is quite impossible to tell whether he took plumage wear into account or not.

To bring this summary to a hurried close, it may suffice to say that Gyldenstolpe[99] and Sclater[1] both reject *neumanni* and place it in the synonymy of *nubica*. In the long series examined by me, individuals of both types occur together from one end of the range of the species to the other, and in every case the birds fitting the description of *neumanni* are in old, worn plumage. The material is extensive, and when taken in conjunction with that studied by Sclater, Gyldenstolpe, and others, is amply sufficient to settle once and for all the status of *neumanni*. It is a pure synonym of *nubica*. Recently[2] Sclater has found that *albifacies* is a synonym of *scriptoricauda* (as is also *aureicuspis*), and suggests that the latter be regarded as a race of *nubica*, apparently overlooking the facts recorded by Van Someren which show it to be specifically distinct. The fact that *neumanni* is but the abraded plumage stage of *nubica* accounts for Neumann's statement that he found the two together at Kwa Kitoto.

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[97] Journ. f. Ornith., vol. 63, p. 17.

[98] Nov. Zool., vol. 29, 1922, pp. 62–63.

[99] Kungl. Sv. Vet. Akad. Handlgr., 1924, pp. 231–233.

[1] Syst. Avium Ethiop., 1924, p. 295.

[2] Bull. Brit. Orn. Cl., vol. 46, 1925, p. 14.

The races of *C. nubica* are as follows:

1. *C. nubica nubica.*—Ethiopia, the Anglo-Egyptian Sudan (from north of Khartoum to Uganda, and from the Red Sea to Korodofan and Darfur, west to the Divide Range), Uganda, Ruanda, eastern Belgian Congo, Kenya Colony (except the semiarid coastal belt and the Jubaland district to the Northern Guaso Nyiro and the Tana River), and northern Tanganyika Territory from the Mwanza, Ikoma, Unyamwezi, and Usukuma districts to Dodoma, east of which it merges with *pallida*.

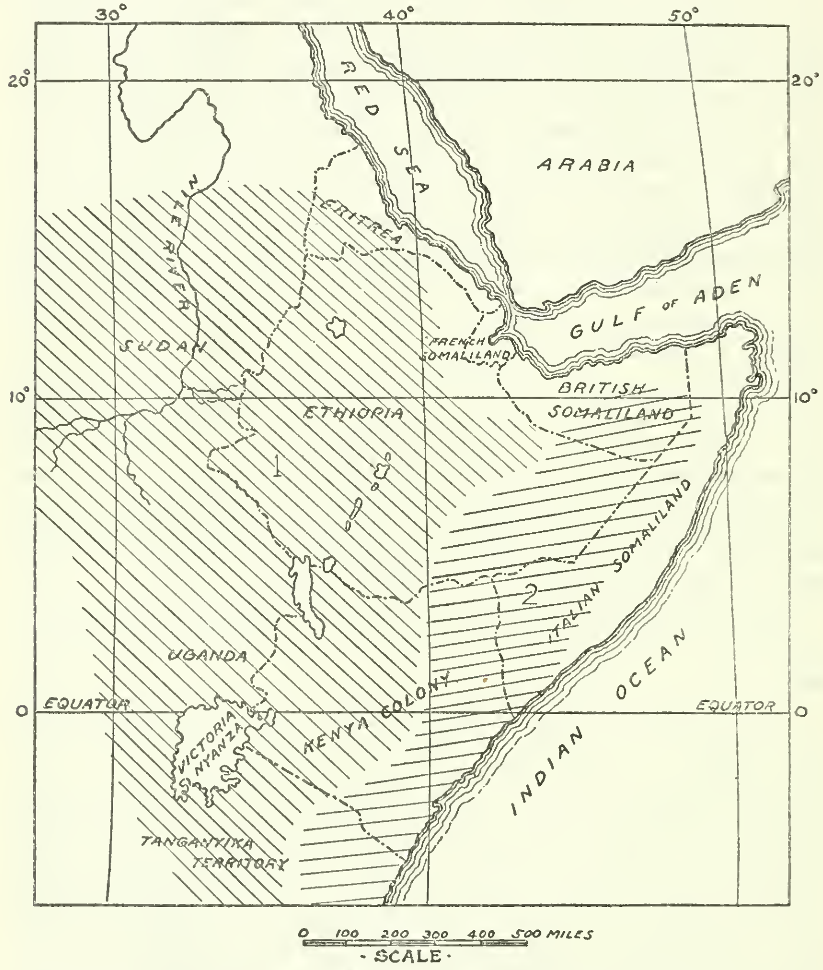

Figure 21.—Distribution of Campethera nubica in northeastern Africa: 1, Campethera nubica nubica; 2, Campethera nubica pallida

2. *C. nubica pallida.*—The range given by Sclater[1] "Somaliland and Gallaland south to the Tana River," should be extended to in-

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[1] Syst. Avium Ethiop., 1924, p. 295.

clude the Taru Desert, Serengeti Plains of the Kilimanjaro district south to Morogoro, Kilosa, and the Pangani River, Tanganyika Territory. A bird from Mpapwa is intermediate according to Neumann.[91]

The series collected by Mearns is remarkable in that it contains no really young birds. If one were to collect, more or less haphazardly, a series of 31 specimens of a species, it would be reasonable to expect a fair percentage of young birds. This absence can mean but one thing—that the juvenal plumage is worn only a very short time, or, to put it in other words, that the postjuvenal molt comes very soon after the birds attain full size. The male from Lake Stefanie, May 17, is the only one with any of the juvenal plumage left. It has the forehead and crown black with white round spots and the malar streak black and white, but red feathers are beginning to appear both on the top of the head and in the malar region.

The caudal molt is remarkable in that it is centripetal, at least, so it appears from a study of skins of molting birds.

The adults vary greatly in the abundance of the spots on the ventral surface, and also in the amount of greenish on the dorsum. The size variations of the series collected by Mearns may be seen from the following table:

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Dire Daoua	♂	111. 0	64. 5	24. 0	20. 5
Do	♂	110. 0	63. 5	24. 5	21. 0
Do	♂	104. 0	59. 0	26. 0	20. 5
Hawash River	♂	109. 0	65. 5	25. 0	20. 5
Aletta	♂	108. 0	59. 0	24. 0	20. 5
Gato River near Gardula	♂	107. 0	63. 0	24. 5	20. 0
Do	♂	110. 0	62. 5	25. 0	21. 0
Do	♂	103. 5	59. 0	24. 5	19. 5
Lake Stefanie	♂	107. 0	59. 5	25. 5	20. 5
Kenya Colony, Endoto Mountains	♂	106. 0	64. 0	25. 0	20. 5
Ethiopia:					
Dire Daoua	♀	108. 5	62. 5	24. 0	21. 0
Do	♀	109. 0	60. 0	25. 0	21. 0
Do	♀	108. 0	64. 0	23. 0	20. 0
Do	♀	110. 0	63. 0	24. 0	21. 0
Sadi Malka	♀	110. 0	65. 0	23. 5	21. 0
Aletta	♀	108. 0	64. 0	23. 0	21. 5
Loco	♀	111. 0	64. 0	25. 5	20. 0
Gato River near Gardula	♀	109. 0	61. 0	24. 0	20. 0
Do	♀	114. 0	67. 0	24. 0	19. 5
Do	♀	115. 5	68. 0	25. 0	21. 5
Do	♀	109. 0	65. 0	25. 0	20. 0
Do	♀	111. 0	66. 0	25. 0	20. 5
Do	♀	107. 0	60. 0	23. 0	20. 0
Sagon River	♀	107. 0	64. 0	24. 0	20. 5
Do	♀	109. 0	65. 0	23. 0	20. 0
Kenya Colony, Er-re-re	♀	100. 0	57. 0	22. 0	19. 0

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[91] Journ. f. Ornith., 1904, pp. 394–395.

This woodpecker is chiefly a bird of the lowlands, but occurs up to approximately 6,500 feet (1,950 meters). Zedlitz found it at 2,000 meters (6,600 feet) at Anseba near Cheren, also in the palm forests of the Barca region and in the wilderness at Tacazzé. Erlanger did not see it in the highlands of Shoa, but observed it very commonly in Somaliland especially in the rich vegetation along stream banks. He collected a female in breeding condition at Wonda, south of Adis Abeba, on December 5, and writes that the breeding season in Shoa is from December to February. In the Ginir district it is somewhat later, as Erlanger obtained two juvenal birds, taken from the nest, on March 17 in that district. Lynes[3] writes that in Darfur the birds breed early in spring. He collected a female that had very recently laid eggs, in May.

In his field book, Mearns entered the following observations of this woodpecker: Aletta, March 7–13, 4 birds; Loco, March 13–15, 6 seen; Black Lake Abaya, March 18–20, 12 birds; Lake Abaya, March 21–23, 2 noted; White Lake Abaya, March 24–26, 10 seen; near Gardula, March 26–29, 2 birds; Gato River, March 29 to May 17, 200 seen; Kormali, May 18, 10 birds; Bodessa and Sagon River, May 19 to June 6, 52 birds seen; Tertale, June 7–12, 10 noted; El Ade, June 12–14, 8; Mar Mora, June 14, 6 seen; Turturo, June 15–17, 22 birds; Wobok, June 18, 4 seen; near Saru, June 19, 4; Yebo, June 20, 2 birds; Karsa Barecha, June 21, 2 seen; Indunumara Mountains, July 13–18, 7 seen; plains at base and south of Endoto Mountains, July 19–24, 30 birds; Er-re-re, July 25, 4 seen; Le-se-dun, July 26, 2 noted; Malele to 45 miles south of Malele, July 27–30, 26 birds observed.

CAMPETHERA NUBICA PALLIDA (Sharpe)

Dendromus pallidus SHARPE, Ibis, 1902, p. 638: Lamu, Kenya Colony.

Specimens collected:

One male immature, one female adult, Guaso Nyiro River, Kenya Colony, August 1–2, 1912.

One female adult, Tharaka district, Kenya Colony, August 13, 1912.

One male adult, Tana River at mouth of Thika River, Kenya Colony, August 24, 1912.

One female adult, Athi River near Juja Farm, Kenya Colony, August 30, 1912.

The characters and distribution of this race have already been discussed under the nominate form and need not be repeated here.

The immature male has a considerable number of red feathers in the malar stripes, but none on the forehead and crown. In a molting specimen of typical *nubica* the red appears simultaneously on the crown and the malar region. As in the typical race, the innermost pair of juvenal primaries are very small, agreeing with the condition found in *Campethera permista* and *C. nivosa* by Chapin.[4]

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[3] Ibis, 1925, p. 345.

The measurements of these specimens are as follows:

Locality	Sex	Wing	Tail	Culmen	Tarsus
Kenya Colony:					
Tana River	♂ adult	111	65	25. 0	20. 5
Guaso Nyiro River	♂ immature	107	67	24. 0	21. 5
Do	♀ adult	107	58	24. 0	21. 0
Tharaka district	do	108	66	23. 5	21. 0
Athi River	do	110	66	25. 0	20. 5

The breeding season of this form in northern Somaliland is in January and February. Lort Phillips[5] found a nest with two fledged young at Sogsoda, British Somaliland, February 16.

Mearns observed this form on the Guaso Nyiro River, July 31 to August 3, 35 birds seen; Lekiundu River, August 4–8, 35 noted; Meru swamp, Equator, August 9, 2 seen; Tharaka, August 12–13, 6 birds; Tana River, August 14–23, 30 seen; Thika River, August 23–27, 50 birds; west of the Ithanga Hills, August 28, 6; and on the Athi River, August 29 to September 1, 52 birds.

DENDROPICOS FUSCESCENS MASSAICUS Neumann

Dendropicos guineensis massaicus NEUMANN, Journ. f. Ornith., 1900, p. 206: Ndala-lani, Lake Nguruman.

Specimens collected:

Two males, Tana River at mouth of Thika River, Kenya Colony, August 23–24, 1912.

In identifying these birds (and the series of *hemprichii*) I have studied a series of all three of the species that have been confused in the literature—*fuscescens*, *lafresnayi*, and *abyssinicus*, totaling some 91 specimens in all, and representing all the East African races. My conclusions agree exactly with those arrived at by Bannerman[6]—that is, I agree that *abyssinicus* has no valid races, that *fuscescens* and *lafresnayi* are best kept as specific groups, the former with four races (*fuscescens*, *massaicus*, *hemprichii*, and *cosensi*), the latter with six forms (*lafresnayi*, *camerunensis*, *zechi*, *lepidus*, *hartlaubii*, and *loandae*). For the convenience of investigators who may refer to the present work, the following disposition of synonyms may be useful.

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[4] Auk, 1921, pp. 531–552.

[5] Ibis, 1898, p. 415.

[6] Rev. Zool. Africaine, vol. 10, fasc. 2, 1922, pp. 94–98.

Dendropicos guineensis centralis Neumann is a synonym of *D. f. massaicus.* Van Someren[7] refers specimens taken by Loveridge at Morogoro, Tanganyika Territory, and Lumbo, Mozambique, to *centralis* and states that these birds differ so markedly from typical *fuscescens* (more so than *massaicus*) that he feels compelled to recognize *centralis.* However, these birds, which I have seen, are all *D. lafresnayi hartlaubii* and not *D. fuscescens* at all.

D. hemprichii albicans Erlanger is a synonym of *D. f. hemprichii,* as the characters of *albicans* may be found in occasional Ethiopian birds from the same localities as typical *hemprichii* and in some Kenian examples of *massaicus.*

D. fuscescens orangensis Roberts.

D. fuscescens intermedius Roberts.

D. fuscescens transvaalensis Roberts.

D. fuscescens capriviensis Roberts.

These four races I am utterly unable to make out with South African material available from the ranges of the first three. I consider them all synonyms of typical *D. f. fuscescens,* at least for the present, as the series I have to work with is small. The alleged differences are slight, but they may be fairly constant, for the local variation in these woodpeckers is quite pronounced as a rule. However, it would require an enormous series and careful mapping of all the ranges to convince me of the utility of such fine geographic subdivision as Roberts proposes. I imagine that *centralis* has as good a claim to recognition as any of these forms, but if the combined series of several of the world's largest museum collections are not sufficient to substantiate it, I can not see any useful purpose in maintaining it in nomenclature. Giving a name to a group of variables only misleads and confuses investigators with less adequate material and merely paves the way for a flood of contradictory opinions about the form in question.

D. guineensis stresemanni is a synonym of *D. f. fuscescens.*

In the same publication in which he describes the four South African races of *D. fuscescens* listed above[8] Roberts describes three new forms of *D. hartlaubii* (which, I assume, is *D. lafresnayi* as currently understood). Of these, I have not the material to form any opinion, but it should be noticed in passing that one of them, *D. hartlaubii natalensis,* is said to inhabit the Natal and Zululand coast northward below the foothills of the Drakensberg into the eastern Transvaal as far north as Zoutpansberg. If this is a form of *lafresnayi* it constitutes a considerable extension of the range of that species. The whole question of the specific distinctness of *fuscescens* and *lafresnayi* is exceedingly involved. If it did not happen that two forms occurred side by side in various places in South and East Africa, the two might readily be considered one species, but inasmuch as there is no evidence to suggest that these geographic coincidences may be due to migration, or that the coincidence in each case is real only on paper, that is, on a map, but not in nature because of ecological variations in the small areas involved, it is necessary to use two binomials for the present. *D. lafresnayi* is more greenish-yellow, less clearly barred with black and white on the back than *D. fuscescens.*

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[7] Nov. Zool., vol. 29, 1922, p. 68.

[8] Ann. Trans. Mus., vol. 10, pt. 2, 1924, pp. 83–85.

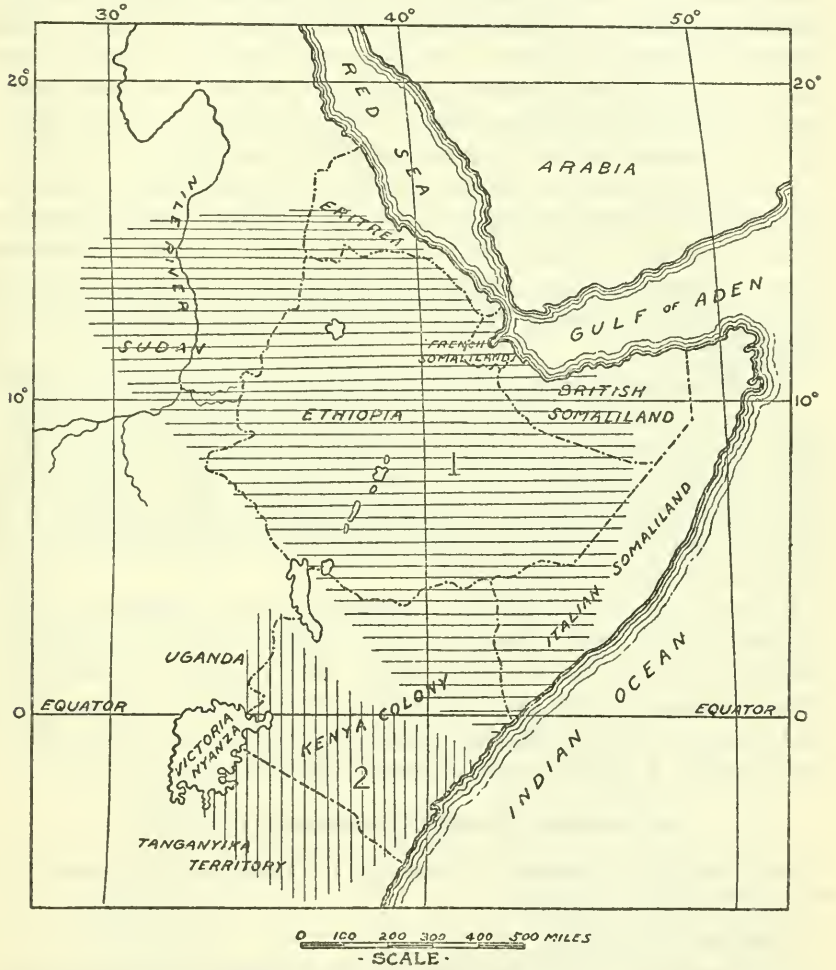

FIGURE 22.—DISTRIBUTION OF DENDROPICOS FUSCESCENS IN NORTHEASTERN AFRICA: 1, DENDROPICOS FUSCESCENS HEMPRICHII; 2, DENDROPICOS FUSCESCENS MASSAICUS

The two races of *Dendropicos fuscescens* inhabiting the territory under discussion in this report are:

1. *D. f. massaicus.*—From Mount Moroto and the Turkwell country in Uganda southeast to Lake Baringo, Kenya Colony, and east through Kenya Colony from Mount Kenia to the coastal districts, the Equator roughly forming the northern limit, south to northern Tanganyika Territory, avoiding the coastal belt.

2. *D. f. hemprichii.*—Kordofan, Sennar, Eritrea, Ethiopia, French Somaliland, the western half or so of British Somaliland, southern Italian Somaliland, Jubaland, and northern Kenya Colony to the Lekiundu River and Lamu. Sclater and Praed[9] do not list this bird in their Sudanese report, and Sclater[10] does not include any part of the Anglo-Egyptian Sudan in the range of this form. However, Reichenow[11] records it from Kordofan and Sennar.

The two specimens of *massaicus* obtained by the Frick expedition are in fairly worn plumage but are not molting. One of them is yellower on the abdomen and has the ventral streaks darker and more distinct than the other. The dimensions of these birds are as follows: Wing 83–84, tail 43–44, culmen 16.5, and tarsus 15–17 millimeters.

The Masai cardinal woodpecker is widely distributed throughout its range, living in pairs or singly in the thornbush country, especially in the more open parts where the acacia and mimosa trees attain a larger size than in the real thickets. Still, it does occur in dense thorny tangles as well, as Van Someren has obtained it at Tsavo, a region where the thorny shrubs and trees form an almost impenetrable mass of vegetation.

Mearns observed it at the following places: Lekiundu River, August 4–8, 40 birds; Meru swamp, August 9, 2 seen; Tharaka, August 12–13, 14 birds; Tana River and junction of Tana and Thika Rivers, August 14–26, 64 noted; Thika River, August 26–27, 10 birds; west of the Ithanga Hills, August 28, 4 seen; Athi River and vicinity, August 29 to September 1, 28 birds noted.

DENDROPICOS FUSCESCENS HEMPRICHII (Ehrenberg)

Picus hemprichii EHRENBERG, in Hemprich and Ehrenberg, Symb. Phys., Av. fol. r, 1828: Akiko, Ethiopia.

Specimens collected:

Four males, two females, Dire Daoua, Ethiopia, December 1–20, 1911.

One male, Moulu, Ethiopia, December 17, 1911.

One male, Sadi Malka, Ethiopia, January 31, 1912.

One male, Hawash River, Ethiopia, February 13, 1912.

One male, near Gardula, Ethiopia, March 28, 1912.

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[9] Ibis, 1919.

[10] Syst. Avium Ethiop., 1924, p. 298.

[11] Vög. Afr., vol. 2, pp. 197–198.

Six males, five females, Gato River near Gardula, Ethiopia, April 1 to May 11, 1912.

One male, Sagon River, Ethiopia, June 4, 1912.

One male, one female, Tertale, Ethiopia, June 8–11, 1912.

One female, Yebo, Ethiopia, June 20, 1912.

One female, Le-se-dun, Kenya Colony, July 26, 1912.

One male, Malele, Kenya Colony, July 27, 1912.

One female, 18 miles south of Malele, Kenya Colony, July 29, 1912.

One male, two females, Lekiundu River, Kenya Colony, August 5–7, 1912.

One male, East Lake Stefanie, Kenya Colony, April 26, 1912. (C. Frick collector.)

One male, North Gallup, Kenya Colony, May 30, 1912. (J. Blick collector.)

Soft parts, male: Iris, dark brownish red; bill, grayish olive; feet, greenish gray; claws, plumbeous. Female: Iris, reddish brown; bill, olive-brown shading to black at tip and to greenish and plumbeous at base of mandible; feet and claws, greenish olive.

The geography and systematics of this form have already been discussed under *massaicus* and need not be repeated here. *Hemprichii* may be told from *massaicus* by the coloration of the upper parts which, in the former, are lighter, the dark bars sooty, not black, and generally less washed with olive green than in the latter.

The size variations of the present series may be inferred from the following table:

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Dire Daoua	♂	82.0	37.0	17.0	16.0
Do	♂	80.0	38.0	17.5	15.0
Do	♂	80.0	40.0	18.5	14.0
Do	♂	80.0	38.0	17.0	15.0
Moulu	♂	82.0	42.5	18.0	15.5
Sadi Malka	♂	81.0	36.0	17.0	14.0
Hawash River	♂	85.0	44.0	17.0	15.0
Near Gardula	♂	85.5	41.0	18.5	15.0
Gato River	♂	81.5	38.5	19.0	15.0
Do	♂	87.0	44.5	19.0	16.5
Do	♂	84.0	38.5	------	14.0
Do	♂	83.0	39.5	17.5	15.0
Do	♂	81.0	43.0	18.5	15.0
Do	♂	82.5	44.0	18.5	15.0
Sagon River	♂	85.0	41.0	------	16.0
Tertale	♂	83.0	43.0	18.0	15.0
Kenya Colony:					
East Lake Stefanie	♂	80.5	40.0	18.0	16.0
North Gallup	♂	81.0	40.0	18.0	16.5
Malele	♂	77.5	40.0	16.0	15.0
Lekiundu River	♂	84.0	41.0	18.5	14.5

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Dire Daoua	♀	80. 0	40. 5	15. 0	14. 0
Do	♀	79. 0	43. 0	16. 5	15. 0
Gato River	♀	85. 0	42. 5	17. 0	14. 0
Do	♀	84. 0	42. 5	16. 5	15. 0
Do	♀	84. 0	42. 0	16. 0	14. 5
Do	♀	80. 0	41. 0	------	14. 5
Do	♀	80. 5	42. 5	16. 5	15. 0
Tertale	♀	79. 0	39. 0	17. 0	16. 5
Yebo	♀	82. 0	41. 0	17. 0	14. 5
Kenya Colony:					
Le-se-dun	♀	82. 0	40. 5	16. 5	15. 5
18 miles south of Malele	♀	79. 0	43. 0	16. 0	15. 0
Lekiundu River	♀	83. 0	43. 5	17. 0	16. 5
Do	♀	84. 0	42. 0	17. 0	15. 0

While specimens of *hemprichii* usually have a considerable amount of red on the upper tail coverts, occasionally one is found without any. One of the females from the Lekiundu River is without the red color, and has a rather peculiar pattern on these feathers. Instead of being plain or barred they are barred on the basal half, and yellowish with a broad dusky shaft streak on the distal half. Six of the birds collected are in molt (April–July). The caudal precedes the alar molt; the former is centrifugal, the latter appears to have a single center of origin—the carpal joint.

This race of the cardinal woodpecker appears to have a remarkably wide altitudinal range. Von Heuglin observed it on the Eritrean coastlands and in Sennar and Kordofan, while in central Ethiopia and Gallaland he obtained specimens up to 11,000 feet (3,300 meters). Blanford,[12] however, intimates that this extensive range is partly accounted for by migration, and writes that:

> * * * this bird keeps to a lower level than the last species (*Campethera nubica*), but is certainly rare, and in the hot season, I think, entirely wanting in the plains near the sea, where however, Brehm records having met with it in the month of April. At the time of the spring rains many birds appear to migrate from the mountains to the plains of Samhar, which are not found there at other times * * *

Blanford saw this bird near Undel Wells, in the pass below Senafé, and in the Lebka Valley at 3,000–4,000 feet (900–1,200 meters). Erlanger[13] writes that in Ethiopia this bird inhabits the lower arid thornbush country, but also occurs in the denser vegetation in the highlands. While he makes no mention of a migratory movement, the ecological difference between the arid low country and the more humid, more forested highlands suggests that the species probably breeds in one and not the other, as very few birds are equally at home in such diverse conditions, and hence bears out, although only vaguely, Blanford's observations. In southern Italian Somaliland the breeding season is in June and July according to Erlanger (who considers the birds of that region distinct—*D. f. albicans*).

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[12] Geol. and Zool., Abyss., 1870, p. 306.

[13] Journ. f. Ornith., 1905, p. 480.

Besides the specimens collected, this woodpecker was recorded as follows: Loco, March 15–17, 2; Black or North Lake Abaya, March 18–20, 6 birds; White or South Lake Abaya, March 24–26, 4 seen; near Gardula, March 26–29, 2 birds; Gato River, March 29 to May 17, 200 noted; Bodessa, Sagon River, June 3–6, 12 birds; Tertale, June 6–12, 12 birds noted; El Ade, June 14, 8 seen; Mar Mora, June 15, 6 birds; Turturo, June 15–17, 4; Wobok, June 18, 8 seen; Yebo, June 19, 4; near Saru, June 20, 2 birds; Barsa Barecha, June 21, 2 seen; Malata, June 22, 1 bird.

DENDROPICOS ABYSSINICUS (Stanley)

Picus abyssinicus STANLEY, in Salt's Voy. Abyssinia, App., p. lvi, 1814: Ethiopia.

Specimens collected:

Four males, Arussi Plateau, Ethiopia, February 20–24, 1912.
One male, Aletto, Sidamo, Ethiopia, March 7, 1912.

This species differs from *D. fuscescens* and *D. lafresnayi* in having the back pure golden greenish yellow without any dark bars or bands. C. Grant [14] considered *hartlaubii* a race of this species, but, as has been shown by Bannerman [15] this form is a subspecies of *D. lafresnayi*, a conclusion with which I certainly agree.

The golden-backed woodpecker is a bird of the highlands of Ethiopia. The four specimens from the Arussi Plateau came from altitudes of from 8,500–9,000 feet (2,550–2,700 meters). Neumann [16] records it as very common at 10,000 feet (3,000 meters) in the mountains of Gofa, and states that it may occur at higher altitudes. He never saw it in the lower valleys. Erlanger [17] found it in numbers in the Degga and Woina-Degga districts and also in the highlands between Harrar and Adis Abeda. The northernmost point at which the species has been reported is the upper Anseba River, where Zedlitz [18] procured a male at about 5,600 feet (1,700 meters). According to this investigator this woodpecker is much rarer in the northern part of its range than in the mountains of Shoa.

Neumann [16] writes that old females in breeding plumage have the golden yellow feathers of the upper back somewhat tinged with reddish, but that this is not true of males of corresponding age and plumage. Erlanger,[17] on the other hand, says that very old males have an orange tone on the upper parts. The adults examined by me are all males and none of them shows any orange or orange red on the upper back.

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[14] Ibis, 1915, p. 460.

[15] Rev. Zool. Africaine, vol. 10, fasc. 2, 1922, p. 98.

[16] Journ. f. Ornith., 1904, pp. 398–399.

[17] Idem, 1905, p. 477.

[18] Idem, 1910, p. 755.

Two of the birds from the Arussi Plateau are young and are in the plumage on which Heuglin based his *Picus melanauchen*[19]; that is, they have the back dusky olive green instead of pure golden yellow, have less red on the occiput, have gray napes, and the upper tail coverts olive green, only tipped with reddish.

The size variations of this species are as follows (males only): Wing 91–95, tail 45–49.5, culmen 17–20, and tarsus 14.5–16 millimeters.

Little is known of the nesting season of this bird. Neumann[16] procured females in breeding condition on February 4 and March 2 in the Gofa and Kaffa regions.

About a dozen birds other than those collected were seen by Mearns, all of them at Aletta.

THRIPIAS NAMAQUUS SCHOENSIS (Rüppell)

Picus (Dendrobates) schoensis Rüppell, Mus. Senck., vol. 3, p. 120, 1842: Shoa.

Specimens collected:

Two males, two females, Dire Daoua, Ethiopia, December 10–20, 1911.

Four males, two females, Gato River near Gardula, Ethiopia, April 12–24, 1912.

One female. Sagon River, Ethiopia, June 4, 1912.

One male, Wobok, Ethiopia, June 18, 1912.

One female, Guaso River, Kenya Colony, August 2, 1912.

One female, Tana River, camp No. 6, Kenya Colony, August 23, 1912.

Soft parts:

Male.—Iris, varying from reddish brown to dark brownish red; bill, from dark slate to plumbeous black, paler at the base of the mandible; feet, greenish gray; claws, black.

Female.—Iris, dark reddish brown; bill, grayish olive to plumbeous black; feet, greenish gray; claws, dusky.

The material available for study does not permit of any serious revisionary study of the geographic variations of this woodpecker, but it is quite doubtful if both *semischoensis* and *intermedius* can be maintained. At least, the former seems to merge with the latter to such an extent that it is questionable if there is any value in recognizing two intermediate races instead of one. *Semischoensis* is said to differ from *intermedius* chiefly in having the breast spotted rather than barred. Lönnberg [20] writes that the Kasindi birds (*semischoensis*) agree, "* * * pretty well with two * * * specimens from Nairobi * * *." Van Someren [21] records *intermedius* from Nairobi and other localities, but notes that "* * * nine out of ten have grey and barred undersurface, while two show a tendency to assuming a blackish-olive breast, spotted with white, showing gradation into the *schoensis* type of plumage. Such birds are found from Nairobi to Nakuru and the Elgeyu Escarpment." He lists *intermedius* from Olgerei, Narorsera, Tsavo, Kitui, Kyambu, and Nairobi. It therefore appears that, on the whole, the western birds from the area between the ranges of *namaquus* and *schoensis* are spotted on the breast (*semischoensis*) while the eastern intermediates are more barred (*intermedius*). I suspect that *intermedius* may be best considered a synonym of the nominate form, and *semischoensis* be regarded as the variable assemblage bridging the gap between it and the northern *schoensis*. Lönnberg [20] himself has said that—

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[16] Journ. f. Ornith., 1904, pp. 398–399.

[17] Idem, 1905, p. 477.

[19] Orn. N. O. Afr., vol 1, 1871, p. 808.

> It is very difficult to get a fully clear view of the *namaquus-schoensis* Woodpeckers and their intergrading especially because sometimes barred and spotted forms appear to occur within the same district. It seems, however, * * * that in the area between the habitat of the typical *namaquus* and that of the typical *schoensis* intergrading forms are to be found. Naturally enough those which have a more northern distribution, *viz.* in British East Africa and westward to Kasindi-Beni are more similar to *schoensis* being spotted on the breast, but more olive than typical northern *schoensis*, and with the black stripes of the head and neck as a rule not joining behind * * * South of the distribution of this * * * *intermedius* is to be found, thus a barred form. Very probably these forms may mix in the adjoining districts so that all kinds of gradations occur.

Of the present series, the bird from the Tana River is the lightest, much lighter than the others and approaches the type of plumage Grant named *intermedius*. However, when compared with north Tanganyikan material it is seen to be nearer to *schoensis*. It constitutes one of the southernmost records for the race; the area south of the Tana River is inhabited by *intermedius* (if that race be maintained). Further to the west in Kenya Colony *schoensis* occurs south to Baringo.

This woodpecker ranges from northern Somaliland through the lower parts of Gallaland to Shoa and the upper White Nile and Bahr el Ghazal regions of the Sudan, south to Turkanaland, the Suk district, and Kerio River in Uganda, to Lake Baringo and the Tana River in Kenya Colony, and throughout Italian Somaliland.

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[20] Arkiv f. Zool., No. 24, 1917, p. 18.

[21] Nov. Zool., vol. 29, 1922, p. 67.

Hartert[22] recorded a bird collected by Ansorge at Nairobi as *schoensis* and since then many writers have claimed Nairobi as the southern limit of the range of this race, but as Van Someren and others have shown, the birds of the Ukamba and southern Kikuyu district (in the latter of which Nairobi is situated) are intergrades between *schoensis* and *namaquus* (or, in other words, *semischoensis* or *intermedius*).

The size variations of the series collected are tabulated below.

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Dire Daoua	♂	130. 0	62. 0	36. 5	20. 0
Do	♂	130. 0	63. 0	38. 0	21. 0
Gato River	♂	128. 0	61. 5	36. 0	20. 5
Do	♂	125. 0	63. 0	31. 0	20. 0
Do	♂	122. 0	62. 0	29. 0	19. 0
Do	♂	124. 0	62. 0	31. 0	19. 0
Wobok	♂	130. 0	63. 0	34. 0	20. 0
Dire Daoua	♀	130. 0	62. 0	34. 0	20. 5
Do	♀	128. 0	59. 0	32. 5	19. 0
Gato River	♀	122. 0	56. 0	31. 0	19. 0
Do	♀	127. 0	58. 0	34. 0	20. 0
Sagon River	♀	129. 5	57. 5	31. 5	19. 5
Kenya Colony:					
Guaso Nyiro River	♀	125. 0	64. 5	31. 0	20. 0
Tana River	♀	125. 0	64. 0	34. 0	19. 0

The bearded woodpecker is a lowland bird, and consequently the northern limit of its range presents a much hollowed out appearance, the southward extending concavity enclosing the highlands of the Arussi country and of Shoa where the species does not occur. Neumann[23] found it common in the Acacia country around Lakes Zwai and Abaya. Erlanger[24] found it chiefly along the river banks in northern Somaliland, living among the the acacias and euphorbias. In the vicinity of Daua and Ganale it occurred in the thin palm forests, while in the Shoan lakes district, he found it around the edges of the forest.

The Sagon River specimen and three of the birds from the Gato River are in molt. Among the latter are a mated pair (according to the collector), a fact that suggests the breeding season to be in spring. Erlanger's[24] observations confirm this as he writes that the nesting time is in May and June. According to Heuglin the molting season is in July and August, but neither of the August birds (from Kenya Colony, however) is in molt. However, as Zedlitz[25] has shown, although Erlanger's observations as to the breeding season apply to southern Italian Somaliland, and Heuglin's notes on molt pertain to Shoa, yet it seems that the molting season in southern Somaliland (as shown by his specimens) is in the summer months just as in Shoa.

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[22] Nov. Zool., vol. 7, 1900, p. 33.
[23] Journ. f. Ornith., 1904, pp. 397–398.
[24] Idem, 1905, p. 475.
[25] Idem, 1915, pp. 18–19.

The wing molt has a single center of origin—the carpal joint; the caudal molt is centrifugal.

The woodpecker was recorded as follows by Mearns: Gato River, March 29 to May 17, 27 birds seen; Bodessa and Sagon River, June 3–6, 12 seen; Tertale, June 7–12, 6 birds; Turturo, June 15–17, 6 noted; Wobok, June 18, 4 birds; near Saru, June 19, 2 seen; dry river south of Hor, July 1–2, 1 bird; Guaso Nyiro River, July 31 to August 3, 10 birds seen.

MESOPICOS GOERTAE SPODOCEPHALUS (Bonaparte)

Dendrobates spodocephalus Bonaparte, Consp. Av., vol. 1, p. 125, 1851: Afr. occ.=Afr. or.; i. e., Shoa, ex Rüppell (Vög. N. O. Afr. p. 86).

Specimens collected:

Five males, one female, Arussi Plateau, Ethiopia, February 24–29, 1912.

One male, Malke, Ethiopia, March 3, 1912.

One male, near Aletta, Sidamo, Ethiopia, March 6, 1912.

Inasmuch as the races of *Mesopicos goertae* have been reviewed several times in the last 30 years,[26] there is no need to go over the subject again.

I have examined a series of 34 specimens of all the forms except *koenigi*, and my conclusions agree with the arrangement adopted by Sclater.[27] The only point that appears to be still somewhat unsettled has to do with the validity of *poicephalus* and *centralis*. The material available for study is limited, but it enables me to differentiate between these two forms, the latter being darker than the former. It may be that more extensive series would reverse this conclusion, but until I see more material, I shall recognize both races as valid.

The geographic distribution of some of the races as given by Sclater is incomplete and may be modified at this point.

M. g. spodocephalus.—According to Sclater this form occurs in southern Ethiopia, while *M. g. abessinicus* is said to inhabit northern Ethiopia and the valley of the Blue Nile to Sennar. It should be noted that Zedlitz[28] found that *spodocephalus* is the form of the highlands of Ethiopia from Shoa to Eritrea, while *abessinicus* is found on the western escarpment of the plateau country of Eritrea and Ethiopia and occurs lower down to Sennar and the Blue Nile.

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[26] Reichenow (Orn. Monatsb., 1900, p. 58); Neumann (idem, 1903, p. 181); Neumann (Journ. f. Ornith., 1904, p. 396); Grant (Ibis, 1915, pp. 468–469); Sclater and Praed (Ibis, 1919, p. 632); Hartert (Nov. Zool., vol. 28, 1921, p. 103); Bannerman (Rev. Zool. Afr., vol. 10, 1922, p. 92)

[27] Syst. Avium Ethiop., 1924, p. 302.

[28] Journ. f. Ornith., 1910, pp. 753–754.

M. g. centralis occurs south to Bukoba, Tanganyika-Uganda border. Van Someren [29] records it from as far east as Baringo in Kenya Colony. Reichenow [30] writes that *spodocephalus* occurs south to Lake Victoria and records a specimen from Baringo. This was shown to be incorrect by Neumann [31] who, however, refers the Baringo bird to *rhodeogaster*. It appears, therefore, that *rhodeogaster* and *centralis* meet (and may intergrade) in the country between Baringo and Elgon. The latter form extends into Turkanaland where it reaches its northeastern limit.[32]

The present race lives in the mountains of Ethiopia (from Shoa and Gallaland to the Harrar range, north to Eritrea) at altitudes of from 6,000 to 10,500 feet, and is commoner near the higher, rather than the lower, limits of its range. The breeding season is in early spring. Erlanger [33] found a nest with one young in the Harrar district on April 9.

All the birds collected are in rather abraded plumage, a fact which, when considered in conjunction with Erlanger's notes on the reproductive season, indicates that this species breeds in worn plumage. This in turn suggests that there is but one complete annual molt—the postnuptial.

Young birds resemble adults but have the upper back more brownish, less golden yellow, and the breast, flanks, abdomen, and under tail coverts faintly barred with greenish white, and pale greenish gray, and have the red midventral patch only slightly developed. I have seen this plumage only in *centralis* and *rhodeogaster*, but Ogilvie-Grant [34] records it for *spodocephalus* as well.

The present series is quite uniform in color, but shows considerable variation in size, as may be seen from the following measurements:

Locality	Sex	Wing	Tail	Culmen	Tarsus
Ethiopia:					
Arussi Plateau	♀	117. 0	62. 0	24. 0	18. 0
Do	♂	108. 0	58. 0	27. 0	18. 5
Do	♂	109. 0	63. 0	25. 5	19. 0
Do	♂	116. 0	63. 0	------	19. 0
Do	♂	115. 0	64. 0	27. 5	19. 0
Do	♂	115. 0	62. 5	27. 0	19. 5
Malke	♂	118. 0	65. 5	28. 0	18. 5
Aletta	♂	111. 5	58. 0	27. 0	18. 5

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[29] Nov. Zool., vol. 29, 1922, p. 66.

[30] Vög. Afr., vol. 2, p. 188.

[31] Jour. f. Ornith., 1904, p. 397.

[32] See Van Someren, Journ. E. Afr. and Uganda Nat. Hist. Soc., No. 16, 1921, p. 33.

[33] Journ. f. Ornith., 1905, p. 473.

[34] Ibis, 1900, p. 304.

I have not seen any material of either *eremiae* or *acholiorum*, and can not form an opinion of their validity.

Aside from the 8 birds collected, 12 others were seen at Aletta and Loco, March 7–15.

JYNX TORQUILLA TORQUILLA Linnaeus

Jynx torquilla LINNAEUS, Syst. Nat., ed. 10, vol. 1, p. 112, 1758: Europe, restricted type locality, Sweden (Hartert).

Specimens collected:
One male, Loco, Ethiopia, March 13, 1912.

The European wryneck winters in India and in Africa south to Portuguese Guinea, Cameroon, the Ubangi-Shari area, northern Uganda, southern Ethiopia, and Somaliland. It has not been recorded from Kenya Colony, and when we remember that the last-named country has been more extensively and intensively collected over than the countries to the north, this lack of records is equivalent to definite proof that the species does not winter that far south. In Ethiopia it is fairly widely distributed all over the country from east to west and from the north to the southern Shoan lake district. According to Zedlitz [35] it does not occur in the Eritrean and Danakil coastal area east of the eastern Ethiopian escarpment. Sclater and Praed [36] report it as "widely distributed in winter but not abundant * * *," in the Anglo-Egyptian Sudan, while in Darfur, Lynes [37] found it to be chiefly a migrant, but also, to a lesser extent, a winter resident.

According to the authors of the Practical Handbook of British Birds [38] this species has two complete annual molts, one during August to September, the other during December to March. In other words, one molt takes place in the breeding range, another in the winter quarters. The present specimen is in good, fresh plumage and had apparently only finished its molt shortly before it was collected.

The wryneck is said to arrive in western Europe (England, France, etc.) by the 10th of March, and the height of the migration comes about the first week in April. The date on which Mearns collected the present specimen is therefore a rather late one, but it is quite improbable that the birds wintering in northeastern Africa are the ones that breed in western Europe. They may well be the ones that nest in eastern Europe.

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[35] Journ. f. Ornith., 1910, p. 752.
[36] Ibis, 1919, p. 634.
[37] Ibis, 1925, p. 347.
[38] Vol. 2, p. 47.

JYNX RUFICOLLIS AEQUATORIALIS Rüppell

Jynx aequatorialis RÜPPELL, Mus. Senck., vol. 3, p. 121, 1842: Southern Ethiopia.

Specimens collected:

Two males, two females, Arussi Plateau, Ethiopia, February 24, 1912.

Grant [39] has reviewed the systematics of this wryneck and the material examined by me fully corroborates and upholds his conclusions. Sclater [40] differs in considering *pulchricollis* Hartlaub a distinct species. This, of course, is a matter of opinion rather than one of fact, but if we accept *thorbeckei* as a race of *ruficollis* (as Sclater does) then it follows that the same treatment must be accorded to *pulchricollis*. Therefore I follow Grant in recognizing five races of the red-breasted wryneck, as follows:

1. *J. r. ruficollis.*—From South Africa to the mouth of the Congo on the west and the Transvaal-Mozambique frontier on the east. Sclater [41] writes that most of the evidence points to the fact that this bird is migratory, "* * * spending the winter from May to October in South Africa, and the other part of the year in central Africa, though Mr. Millar is rather of opinion that it is found near Durban all the year round." To this I may add that in central Natal (Karkloof district) the species is definitely known to nest, and I have collected a young bird in a very advanced stage of the postnatal molt at Claridge, Natal, on October 29. In that region, however, it is a migrant according to several competent local observers (i. e., it is a "summer resident," leaving in midsummer as it begins nesting in late winter—August). Grant [39] writes that the British Museum possesses specimens taken in April, May, June, August, November, and December, "* * * which does not altogether point to this race only wintering in South Africa."

2. *J. r. cosensi.*—Southern Kenya Colony from Simba to the Elgeyu escarpment and Mount Elgon. Similar to the nominate form, but larger, wings 94 to 101 millimeters as against 90 to 95 millimeters.

3. *J. r. aequatorialis.*—Southern Ethiopia. Similar in size to *ruficollis* but differs in having the reddish pectoral area much more extensive caudally, the color continuing down the sides and flanks to the under tail coverts.

4. *J. r. pulchricollis.*—Upper Nile east of the Bahr el Jebel. Differs from all the above in having the red restricted to the breast,

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[39] Ibis, 1915, pp. 471–473.

[40] Syst. Avium Ethiop., 1924, p. 304.

[41] Birds S. Afr., vol. 3, 1903, p. 143.

the throat being whitish barred with black. Known only from the types.

5. *J. r. thorbeckei.*—Cameroon. Differs from *pulchricollis* in being more reddish brown above, and in having a larger bill. Bannerman and Bates[42] write that their five specimens of *thorbeckei* have bars on both webs of the longer remiges while according to Hartlaub's description[43] of *pulchricollis*, in the latter form these bars are almost obsolete on the inner webs, except on the first primary.

The specimens brought back by the Frick expedition are in fairly fresh plumage and are all fully adult. Granvik[44] notes that in *cosensi* young birds have the sides of the throat banded brown and black instead of white and black as in adults. This is also true of *aequatorialis.* The measurements of the adults show that males are slightly larger than females: Wing, male 91–93, female 89–89.5; tail, male 76–79, female 77–78; culmen, male 16.2–17, female 15–16.5; tarsus, male 20–22, female 20–21.5 millimeters.

In *Jynx ruficollis* the outermost primary is longer in the juvenal plumage than in subsequent ones, but the difference is not as great as in *Jynx torquilla.*

The altitudinal range of this wryneck is quite considerable. Mearns collected the present series at an altitude of 9,000 feet (2,700 meters), while other specimens have been taken as low as 5,000 feet (1,500 meters). The range is not as large as that of *cosensi*, where the limits as far as known are 3,400 feet (1,030 meters) (Simba) and 9,000 feet (1,700 meters) (between Londiani and Eldoret).

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[42] Ibis, 1924, p. 219.

[43] Idem, 1884, p. 28, pl. 3.

[44] Journ. f. Ornith., 1923, Sonderheft, p. 92.

EXPLANATION OF PLATES

PLATE 1

JACKSON'S BARBET, *Trachyphonus erythrocephalus jacksoni* Neumann. Male and female.

The birds figured are from Gato River and show an approach to *T. e. versicolor.*

PLATE 2

Upper: Adis Abeba, Ethiopia.

Lower: Escarpment near Ankober, Ethiopia.

(Photographs by Childs Frick.)

PLATE 3

Upper: Hawash River; Dr. E. A. Mearns and boys on left.

Lower: Doctor Mearns with giant bustard.

(Photographs by Childs Frick.)

PLATE 4

Upper: Forested slopes of the mountains of Arussiland, Ethiopia, taken at Ansha Mountain.

Lower: Scrub country of the Arussi highlands, taken at Kaka Mountain.

(Photographs by T. D. Carter.)

PLATE 5

VIEWS IN THE HIGHLANDS OF ARUSSILAND, ETHIOPIA

Upper: Ansha Mountain.

Lower: Kaka Mountain.

(Photographs by T. D. Carter.)

PLATE 6

Upper: Ravine in the Chilalo Plateau, Ethiopia.

Lower: Aletta, Ethiopia; Dr. E. A. Mearns (on mule) and boys crossing stream.

(Photographs by Childs Frick.)

PLATE 7

Upper: Tertale, Ethiopia; porters making camp.

Lower: Sidamo, Ethiopia.

(Photographs by Childs Frick.)

PLATE 8

Upper: Lake Abaya, Ethiopia.
Lower: Another view of Lake Abaya.
(Photographs by Childs Frick.)

PLATE 9

Upper: North end of Lake Abaya, Ethiopia.
Lower: Swamp at north end of Lake Abaya, Ethiopia.
(Photographs by T. D. Carter.)

PLATE 10

Upper: Gardula; women working in native shamba; bird lookouts on left.
Lower: Valley of Gato River, Gardula, Ethiopia.
(Photographs by Childs Frick.)

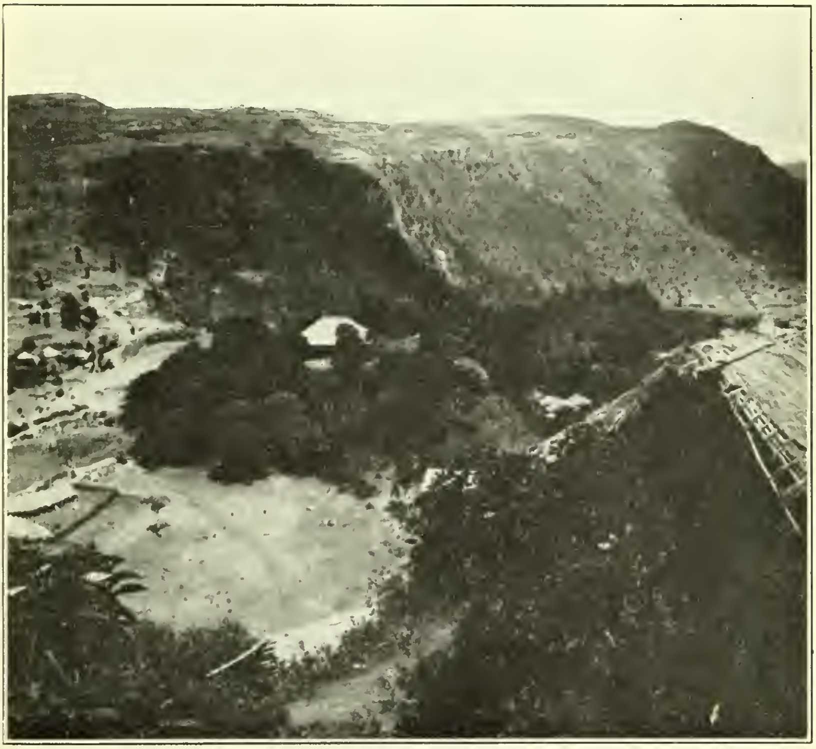
PLATE 11

Upper: Shores of Lake Rudolf. The birds are marabou storks.
Lower: Omo River near north end of Lake Rudolf.
(Photographs by Childs Frick.)

PLATE 12

Upper: A palm grove in an oasis east of Lake Rudolf, north of Hor Mountain, Kenya Colony.
Lower: Forest on Hor Mountain, Kenya Colony.
(Photographs by Childs Frick.)

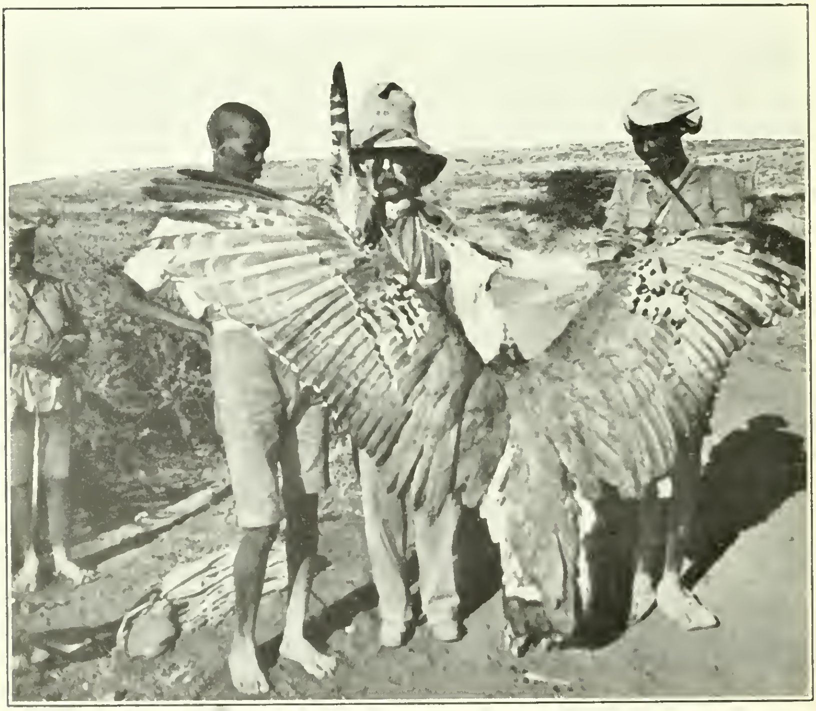
Adis Abeba



Near Ankober

For explanation of plate see page 497

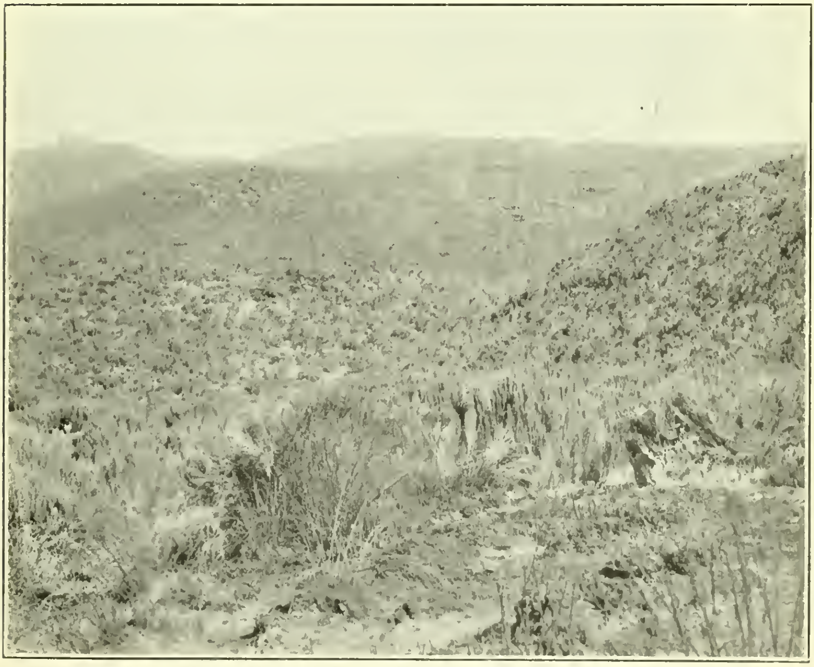
SCENE ON THE HAWASH RIVER



DOCTOR MEARNS AND GIANT BUSTARD

FOR EXPLANATION OF PLATE SEE PAGE 497.

FORESTS OF THE ARUSSI HIGHLANDS



SCRUB COUNTRY OF ARUSSI HIGHLANDS

FOR EXPLANATION OF PLATE SEE PAGE 497.

ANSHA MOUNTAIN

KAKA MOUNTAIN

FOR EXPLANATION OF PLATE SEE PAGE 497

CHILALO PLATEAU

NEAR ALETTA

FOR EXPLANATION OF PLATE SEE PAGE 497

TERTALE CAMP

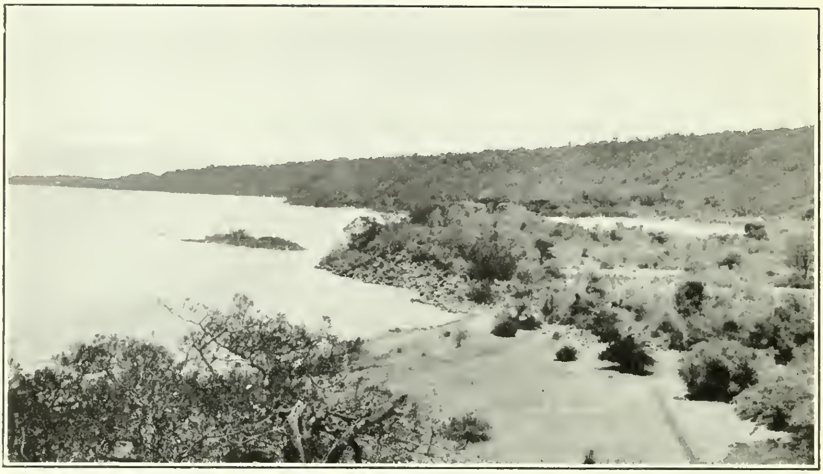
SIDAMO

FOR EXPLANATION OF PLATE SEE PAGE 497

Lake Abaya

Lake Abaya

For explanation of plate see page 498.



North End of Lake Abaya

Swamp North of Lake Abaya

For explanation of plate see page 498.

GARDULA

NEAR GARDULA

FOR EXPLANATION OF PLATE SEE PAGE 498.

LAKE RUDOLF

OMO RIVER

FOR EXPLANATION OF PLATE SEE PAGE 498.

Oasis East of Lake Rudolf

Forest at Hor

For explanation of plate see page 498.

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